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Long-Day Problem Submitted to Industry

President Gary Appoints Committee, but Says All Steel Manufacturers Have a Responsibility and Opportunity—Meeting of American Iron and Steel Institute

THE solution of the 12-hour day problem is now entrusted to the entire iron and steel industry. Although the investigation of the subject will be carried on by a committee of nine, President Gary, of the American Iron and Steel Institute, at the twenty-first general meeting at the Hotel Commodore last Friday, emphasized the fact that the responsibility for thorough inquiry is very largely in the hands of all men in the industry, and they were urged to do their utmost to bring about a just decision. President Gary also emphasized the importance of approaching the solution of the question in the proper frame of mind, not in a negative way, looking for obstacles, but in a positive way, with a determination to abolish the 12-hour day, if it is possible to do so. His very earnest presentation of the subject was not greeted by any manifestation of approval or disapproval. It was evident, however, that the members were thinking intensely and that the hope of a just solution rests in that fact.

The members of the committee on the 12-hour day are as follows:

Elbert H. Gary, chairman United States Steel Corporation.

James A. Farrell, president United States Steel Corporation.

Charles M. Schwab, chairman Bethlehem Steel Corporation.

Willis L. King, vice-president Jones & Laughlin Steel Co.

Alva C. Dinkey, president Midvale Steel & Ordnance Co.

James A. Campbell, president Youngstown Sheet & Tube Co.

James A. Burden, president Burden Iron Co.

L. E. Block, president Inland Steel Co.

John A. Topping, chairman Republic Iron & Steel Co.

President Gary presided at the morning session, and William A. Rogers, Rogers, Brown & Co., Buffalo, one of the directors, at the afternoon session.

The White House Conference

At the opening of his address, President Gary spoke with deep feeling of the recent death of Dr. Henry M. Howe, honorary member of the Institute. He referred to Dr. Howe's world-wide fame, and requested that all the members, in silent, reverent, affectionate testimony to his worth and their grief, rise for a moment, which was done in a very impressive manner.

President Gary, before beginning his formal address, spoke extemporaneously of the recent conference at the White House, in which about 40 prominent members of the Institute were the guests of President Harding. He said the meeting was very simple, homelike and frank. The steel industry certainly had no reason to complain of the attitude shown by President Harding. The speaking, which included nearly everyone present, was done while the guests were seated, as the President believed that would be the more cordial way and would be likely to bring out more frank discussion, as he thought that perhaps those who were not in the habit of speaking in public would be embarrassed by standing. "If," said Judge Gary, "the President knew how well the steel men can talk while standing, he would have had no anxiety as to their ability to forcibly and clearly express their views. The President said, however, that in deciding upon the informal method he was thinking largely of himself. Usually, he said, he prepared before speaking, but he had nothing prepared before the recent conference. He told us informally what was in his mind. He wanted to talk and to hear his guests talk about the 12-hour day, but had no intention of inter-meddling or of injuring the industry. He believed there is a well-defined sentiment against the 12-hour day. He knew it would be difficult to make this important change except by concerted action of all the industry, but he thought, if such action could be taken, the 12-hour day should be abolished. He did not intend to insist unduly, but if he could be helpful in bringing about the abolition of the 12-hour day, it would be very pleasing to him.

Explained to President

"We expressed to him, in the first place, our appreciation of the disposition of the President in holding a frank discussion by representatives of the whole industry of the question of great interest to the public. We told him it was our desire to get rid of the 12-hour day, if practicable. We told him in some detail of the difficulties presented. One important fact to be remembered is that the men who work very hard work eight hours, while those who are on duty 12 hours do not have continuous labor and are really working only half the time. We told him of the desire of the men to earn the largest amount possible and hence of their willingness to work long hours. We did not attempt to deny tha there is strong public sentiment against the long day. Some of the public expressions have been in good faith and some are a sort of propaganda by people who were not well-informed. We told the President that the question is largely between the work-

man and employer on one side, and on the other the purchasing public who would pay the extra cost of reducing the hours of labor. We assured him that we were open-minded and intended to do the right thing, realizing that the public interest is paramount and that our own interest should be subordinate. We assured him that we would co-operate with him to the utmost.

"The President appreciated our position and he understands that that there are many difficulties in the way, but he showed signs of being in earnest, in dead earnest, and he relies upon us to do as he requests, if it is possible.

All Urged to Help

"As president of this Institute, it becomes my duty to appoint a committee to carry on investigations to obtain all the data possible bearing on this problem, to ascertain the desires of the workers and of the public and then give most careful thought to report to the industry. We talked first to appoint a committee of five, but I think there should be nine to represent the different phases of the industry, one that would be fair and just and representative. There will be no effort to appoint a committee prejudiced for or against the 12-hour day, but rather one whose members will have open minds. You, gentlemen, can be of assistance in justice to yourselves and to all, including the President of the United States. To help in this investigation you should furnish your written views on this question in such form that they will be worthy of being read and considered. Then when the final decision is rendered, it should be such that no fair-minded man or publication should have just reason to assail the industry if the report favors permitting the 12-hour day to continue. The opportunity is before you, the responsibility is yours. Let us commence this investigation with a determination to find ways and means of getting rid of the 12-hour day. Much depends upon the attitude of mind in approaching the subject. If we consider only the difficulties and see only the obstacles, we will never accomplish anything. If we try to bring about the abolition of the 12-hour day, there is real reason to hope that we shall be able to do so. The committee will not attempt to influence your judgment, but when you make up your mind, be sure that the decision is such that you can justify yourself before the public and in your own conscience."

Pending Legislation

In opening his formal address, Judge Gary first referred to legislation and took a decided stand in favor of the enforcement of law, saying, "The prosperity and welfare of all the people depend upon the enactment, the administration and the enforcement of law. It furnishes the fundamental distinction between human beings of to-day and the cave dwellers of the past.

"All fair-minded, right-thinking men and women will agree that laws should be adopted, maintained and enforced strictly on the basis of equal opportunity and equal responsibility to every man, woman and child, wherever located and whatever the surrounding circumstances may be.

"I trust we of the iron and steel industry are conscious of our obligations to the laws of the land, to the general public and to our neighbors, those with whom we come into business contact. This should be our constant thought and study. This is a substantial part, nay, the controlling spirit of this Institute.

"On the other hand, we have the right to insist that all others shall be required to conform to the same strict accountability; and that we shall receive the same protection and benefits that are accorded to others."

Tariff Legislation

Judge Gary next took up the tariff, saying that revision of tariff laws is an intermittent disease. He

"Tariff rates should be high enough to protect all producers in this country, including capital and labor, against destructive foreign competition, which may come from cheap labor or otherwise, and might drive both domestic capital and labor out of employment. They should protect domestic production fully up to the point of being on a parity with all foreigners as to selling prices in the United States; but they should not be high enough to permit producers to oppress consumers by unreasonable and unconscionable prices."

Governmental Regulation

Referring to the regulation of industry and investigations, Judge Gary said:

"We may concede that searching inquiry is sometimes necessary and generally productive of good and still be justified in characterizing many of the investigations and investigators as a public nuisance, especially if there is an attempt to go beyond the legitimate domain of the examination, and more particularly, if misrepresentations or unfair methods are indulged in.

"When it comes to our industry or any other important branch of economic activity, as you know, I have always favored reasonable publicity. I know some of you may believe I have gone too far in my expressions of opinion upon this subject, but I have endeavored to look to the future and to consider the question from all sides and from the standpoint of the best interests of all."

Judge Gary took decided stand against special favors and said that the consideration of mere personal and private benefit or injury to any single factor in our industrial life has no proper place in the genius of our nation. He added:

"To permit labor associations or farmer organizations to do, as the result of combination, things that are claimed to be beneficial to them which are denied to others is to create classes, to favor some of them and to injure the whole body politic. It tends to array class against class, and it adds to the cost of production. And be it remembered the general purchasing public, in the end, must pay the bills. This, as a net result, is certain."

Soldier Bonus

Without going into a discussion of the merits of a bonus or reward to millions of soldiers, involving billions of dollars, Judge Gary said that the country, for the present at least, cannot afford to pay or appropriate the large bonus which has been suggested, for the burdens of taxation resulting from the war are already too heavy to carry without materially and adversely affecting the full return to prosperity. He believed that if a bonus is paid, there should be provided taxation which would be universally distributed. The fairest method of taxation, he said, is found in the sales tax.

"It is the most easily, cheaply and certainly collected. It has been found in other countries to be practicable, satisfactory and successful. The tendency is to make persons more economical and saving. The sales tax is just because it leaves to everyone the opportunity to decide what the amount shall be over and above actual necessity. It is less difficult to collect large amounts and works less hardship to honest people because it is so widely distributed. A cent each to twenty men is twice as much as ten cents to one man. Under the present income tax laws the cost of collection is unreasonably large, and many who are able to pay escape. For the good of all the people as a net result a sales tax is desirable."

As to possible legislation relating to the payment or cancellation of the sums due our country by foreign nations, Judge Gary said:

"For the good of both creditor and debtor all honest debts should be paid, if possible, though a generous and humane creditor will always be liberal in extending the date of payment in times of urgency."

Business Conditions and Prospects

In conclusion, Judge Gary discussed business conditions and prospects as follows:

"Since the armistice of 1918 I have never spoken publicly without referring, though with brevity, to

the signs of danger and depression, the possibility of demoralization and disaster as the result of the military cataclysm which for four years and more convulsed the world. We have not, I think, entirely passed from under the clouds of adversity. Certainly we are carrying hitherto unheard-of heavy governmental financial burdens. At best, these will not soon be fully discharged. To bear them gracefully and contentedly there must be not only forbearance, encouragement and assistance from every department of government up to the limit of propriety and justice, but there must also be entertained by every individual, consistently and constantly, a spirit of patience, pluck, energy, generosity, loyalty and charity fully up to his or her highest intelligence.

"Gentlemen here assembled, we must do our part. We must be fair and just, as loyal to the Government as we were during the war. We must treat others in such manner as to be entitled to their approval.

Business Conditions Improving

"Little need be said about the changed and changing business conditions for the better in the iron and steel industry. The facts and figures have been and are being published. The volume is large and increasing. The profits are not satisfactory, but few, if any, ought to be doing business at a loss, and we shall, soon I hope, settle down to a readjusted basis of prices and rates that is fair and reasonable and on a comparative parity.

"Let us be moderate in our demands. Profiteering will be more and more exposed and eliminated. I could, if necessary, refer to some outrages that still exist; but the general public, when correctly informed, is disposed to be just and it will not long overlook nor condone the exceptional glaring injustices that still obtain in prices and rates.

"Ever since the armistice was signed, when I have spoken, it has been hopefully as to the long business future. I am still an optimist. And likewise are you. It is seen in your countenances. Big, even profitable, business has been ahead of us all these years, though it has been at times obscured. Now we seem to be nearer a realization. But everyone in official or private life, employers and workmen, professionalists, merchants, financiers, mechanics, artisans, all, properly supported by our Government, may and will, as never before, utilize to the greatest advantage of our own people and others the existing and productive wealth of this great country.

"Optimism arises from opening one's eyes and ears and mind to the good things in life which a merciful and overruling Providence has bestowed. May all of us have sense to appreciate. Pity the chronic blind, deaf and foolish pessimist of the United States!"

Sir William B. Peat Speaks

At the conclusion of Judge Gary's address he introduced Sir William B. Peat, a prominent financier of London. On many occasions, especially at the time American steel manufacturers visited Belgium in 1911, Sir William was extremely courteous, and it was a genuine pleasure for those who had met him before in this country or abroad to greet him at the meeting of the institute.

He spoke briefly, saying that he brought a message of peace and good-will from his side of the world to ours. The United States had become a great economic force in the world. "You have," he said, "countless money bags stored away in Wall Street, but you cannot eat them. I hope and believe you will use your opportunity to promote the industries of other countries. In order to export you must import. You cannot send fully equipped ships abroad and have them come back empty. The world is one great workshop. We depend upon each other."

At the noon meeting of the directors of the institute, Judge Gary and other officers were re-elected with the exception of Edward Bailey, treasurer. That position was filled by the election of E. A. S. Clarke.

Field Marshal French Guest at Banquet

THE banquet was attended by about eleven hundred guests. The guest of honor was Field Marshal Rt. Hon. Earl French of Ypres. In presenting the Field Marshal, President Gary told the very interesting story of the great service which the honorable guest had rendered at the opening of the world war, praising his courage, skill and ability in preventing the Germans from overwhelming the French, Belgian and English forces.

Field Marshal French modestly said that he is not a public speaker, but only a plain soldier. He felt keenly his deficiency, but he wished to try to express his feeling of deep gratitude on account of the very cordial reception in this country, although he is traveling merely as a private citizen of Great Britain. He then told of some of his experiences in the war and of the grim determination of the French, who had made up their minds that they would win. He said that he believed that was the reason they did win. He then paid an earnest tribute to the part taken by the United States. Marshal French said that finally, when the real history of the great war is written, the part played in it by the army and navy of the United States would have a conspicuous place. He spoke particularly of the wonderful transportation of the navy in sending several million men across the ocean in a short time. He also referred to the splendid results of the fighting of the American boys. "You claim," he said, "not to be a military nation, but who can help being a military nation? Just think of your Civil War. Every military man in the world who knows his business has studied the Civil War and has learned lessons from it. We know all about the great generals of the Civil War and their splendid achievements."

After paying tribute to the women for their work which they had done during the war in the shops, in the hospitals and at the front, the marshal said that the story of woman's work would fill a page in history. He next referred to the relation of the manufacture of steel to war. "We are told by some people," he said, "that in the future war will be carried on largely by chemists and airplane engineers. I do not believe it. I believe that steel and war will be associated as long as there is war. The infantry is the queen of battle just as steel industry is the king of business." In conclusion, Field Marshal French said the late J. Pierpont Morgan was right when he said that he felt sorry for anyone who was a bear on the United States.

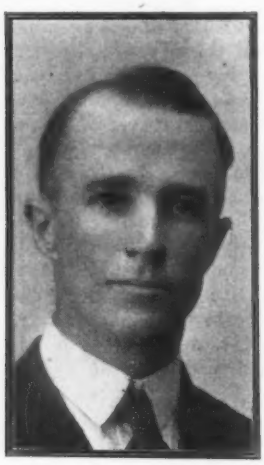
Dr. John S. Unger, head of research bureau of the Carnegie Steel Co., spoke half seriously and half facetiously on the manufacture of iron and steel in the future. Concluding with these verses:

Strange things will be done
Through the years as they run
By the men who make our steel,
Through the prophets' sight
We will see the light
That the future will reveal.

If we turn and look back
Over the long, long track
Of the years through which we passed
We can see as we view
Things which appeared new.
They're old now:
We fear they won't last.

The last speaker of the evening was Willis F. McCook, president Pittsburgh Steel Co., who spoke very earnestly against anything that tends to organize one class against another, whether it is farm blocs, the Ku Klux Klan or any organization that causes people to antagonize each other on account of race, religion or class connections.

Authors of Papers Read at Institute Meeting



HERBERT F. MILLER, JR.

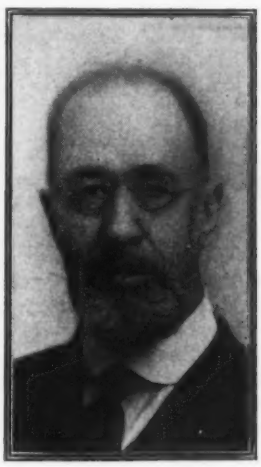
C. L. WOOLDRIDGE

DAVID BAKER

W. C. BULMER

WILFRED SYKES, whose paper took up the general effect of electrification of steel mills upon their operation, was born in Palmerston, North New Zealand, in 1879 and educated in the state and private schools of Victoria and Melbourne. His technical education consisted of a course in electrical and mechanical engineering at Melbourne Technical College and electrical engineering at Melbourne. From 1900 to 1903 he was assistant engineer of the Knox Schlapp & Co., Melbourne, designing electrical and mining installations. In 1903 he became manager of the branch office at Sydney and until 1905 was engineer in charge of electrical work. His next connection was with Staerker & Fisher, in charge of the office in Victoria and Tasmania on transfer of business from Knox Schlapp & Co. In 1907 he became engineer for the Allgemeine Elektricitäts Gesellschaft, Berlin, handling mining work for South Africa. In 1909 he took up work with the Westinghouse Electric & Mfg. Co., East Pittsburgh, in charge of industrial engineering, which included all mining work; and at present is assistant to the operating vice-president of the Steel & Tube Co. of America, Chicago. Dr. Sykes is a member of the American Institute of Electrical Engineers and is chairman of the committee on the use of electricity in mines.

DR. LOYAL A. SHOUDY



FRANK L. NASON

WILFRED SYKES

HERBERT FLETCHER MILLER, JR., author of the paper on methods of using fuel in open-hearth furnaces, has written a number of articles on the design and operation of open-hearth furnaces and on the making of open-hearth furnace steel. He was born Oct. 19, 1885, at Auburndale, Mass.; attended the Quincy High School, Quincy, Mass., and in 1908 graduated from Harvard University, having specialized in metallurgical engineering. He went immediately into the Homestead Steel Works of the Carnegie Steel Co. and remained there three years. From 1911 to 1913 he was superintendent of the open-hearth department, Verona Steel Castings Co. The following year, he held a similar position with the Sweet's Steel Co., and in 1916 became assistant superintendent of the open-hearth department in the Sparrow's Point plant of the Bethlehem Steel Co. Subsequently he became works superintendent, Hewitt Steel Co., 1916; open-hearth efficiency engineer, Lackawanna Steel Co., 1917, and in September, 1921, became assistant superintendent of the Lackawanna Steel Co., which position he now holds.

DAVID BAKER, who was properly assigned to cover the development of the iron and steel industry of Australia, may well be called an American iron and steel works engineer of international connections. He was born in Boston in 1861. After graduating from the Massachusetts Institute of Technology as a Mining Engineer in 1885, he took charge of the blast furnaces of the Pennsylvania Steel Co. From 1887 to 1897, he was in charge of the erection and operation of blast furnaces of the Maryland Steel Co., and from 1897 to 1898 served as metallurgical superintendent of that company. In 1898 Mr. Baker became superintendent of blast furnaces at the South Works of the Illinois Steel Co., with which company he stayed until 1902. His next move was to become general manager of the Dominion Iron & Steel Co. at Sydney, Cape Breton. From 1905 to 1913 he was a consulting engineer with headquarters in Philadelphia. Since then he has been consulting engineer in charge of construction and manager of the steel plant of the Broken Hill Proprietary Co., Ltd., at Newcastle, New South Wales.

C. L. WOOLDRIDGE, who gave the paper on industrial housing, is general superintendent Carnegie Land Co., which company has charge of all the housing operations for the Carnegie Steel Co. Mr. Wooldridge was educated at the University of Pittsburgh, and began his business activities with three years' service with the Pressed Steel Car Co. as superintendent of the Allegheny Works. Following this, five years were spent with the T. A. Gillespie Co., contractors, as resident engineer on the construction of government dams across the Ohio River, and also of the Pittsburgh fil-

tration plant. For six years he served with the Board of Public Education, school district of Pittsburgh, as superintendent of buildings. In 1918 he was selected by the United States Steel Corporation to design and build the industrial housing development in connection with the Neville Island ordnance plant, which project was stopped by the termination of the war. Since 1918, he has been with the Carnegie Steel Co. as aforesaid.

W. C. BULMER, to whom was assigned the paper on gas and air valves for open-hearth furnaces, was born in 1881. A boy of 16, he began his industrial career by going into the Ohio Works of the National Steel Co. (at present the Carnegie Steel Co.). This was in 1897. In 1901 he was given charge of locomotive repairs and a year later was made machine shop foreman. In 1903 he resigned to return to school, and in 1909 graduated from the engineering department of the University of Michigan, going again into the Ohio Works of the Carnegie Steel Co., this time as efficiency engineer in the steel department. In 1911 he resigned his position there and went as master mechanic to the American Steel Foundries Co., Franklin, Pa. In two years, however, he was back in the Steel Department of the Ohio Works, and in 1916 was made superintendent of the open-hearth and Bessemer departments, which position he now holds.

FRANK LEWIS NASON, whose paper was on the importance of the iron ores of the Adirondack region, was born in Wisconsin in 1856, but grew up and obtained his early education in Vermont, entering Amherst College in 1878. He was graduated in 1882 and received his master's degree in 1885. In 1888 he became assistant state geologist of New Jersey, and in 1889, acting state geologist at which time he carried out researches on the iron ores and rocks of New Jersey, New York and Pennsylvania. In 1890 he became assistant state geologist for the State of Missouri. He was subsequently manager of placer mines in British Columbia; superintendent Mt. Wilson Gold and Silver Mining Co., Wilson, Col.; consulting geologist, Derby Lead Co., Central Lead Co., and Guggenheim Exploration Co. From 1901 to 1904 he served as consulting engineer of the Ringwood Co., New Jersey. Since 1904 he has served in that capacity for the United States Steel Corporation, also since 1905 for the New Jersey Zinc Co., and since 1907 has been consulting geologist, Witherbee, Sherman & Co. and Jones & Laughlin Steel Co. Mr. Nason is a Fellow of the Geological Society of America, Fellow of the American Association for Advancement of Science and belongs to the American Institute of Mining and Metallurgical Engineers and the Society of Economic Geologists. He is author of various reports of the Geological Survey covering Missouri and New Jersey, and of a treatise on the iron ores of Missouri.

LOYAL A. SHOUDY, chief surgeon, Bethlehem Steel Co., Bethlehem, Pa., is well qualified both by experience and training to discuss the relation of the doctor to the steel plant. Born and reared in the State of Washington, the years he spent "drifting East" were filled with a fortunate sequence of professional and industrial activities. He graduated from the University of Washington in 1904, took his doctor's degree at the University of Pennsylvania in 1909, serving in the Lankenau and Mary Drexel hospitals of Philadelphia in 1912 and 1913. In 1914 he went to work as surgeon for the Bethlehem Steel Co., becoming chief surgeon in 1919. Dr. Shoudy is known for his work on the National Safety Council, as chairman of the Health Service Section, 1917-18, a member of the executive committee 1917-20, and a member of the board of directors. He is likewise on the executive committee of the Association of Industrial Physicians and Surgeons and a member of the Conference Board of Physicians in Industry. He is also chairman of the committee on first aid standardization for the National Safety Council

Using Fuel in Open-Hearth Furnaces

Effects of Experiments in Varying the Position of the Fuel Intake—Future Role of High Pressures

BY HERBERT F. MILLER, JR.*

ABOUT 10 years ago I was in charge of a small open-hearth furnace plant where oil and natural gas were used for fuel. At that time the furnaces were slow and had high fuel and repair costs. These unfavorable conditions in reality afforded a splendid opportunity to experiment.

One of the furnaces was of the producer gas type with a single brick gas port. Oil was used for fuel and was introduced through a water-cooled tuyere which projected across the uptake and terminated just short of the nose of the port. The time of heats made with this method of installation averaged 6½ hrs. It was thought that if the water-cooled tuyere was pulled back the flame, having more distance in which to travel before reaching the hearth, would be in better shape to do its work.

Over a period of some weeks the burner was gradually pulled back, but no very marked change in the appearance of the flame occurred until it was decided to place the end of the burner projecting above but not entirely across the uptake leading into the gas port. The furnace had two air uptakes and a gas uptake, which, however, was used to transmit air to the gas port, so that in reality there were three air uptakes at each end of the furnace.

Fig. 1 shows a producer gas furnace equipped with water-cooled oil burner. The tip of the oil burner was moved back from point A to point B. With the burner in the position last described, there was a most startling change in the appearance and power of the flame. The flame turned to a pure dense white such as I had never before seen. The time of the heats dropped to an average of 4 hr., or 2½ hr. faster than formerly. Magnesite brick in the bottom of the port melted together; the arch of the port melted and the roof of the furnace burned quite easily. Of course this method of burning fuel could not be continued under the construction then in use, as the furnace would soon have burned down. The uptake leading to the gas port was blocked off and the furnace proceeded in the normal way. I have repeated this experiment with other furnaces and have had the same results.

The first thought suggested is that this method is not a practical one to use, as the open-hearth furnace brickwork will not stand the temperature. Let us first examine the facts surrounding this experiment. The oil was introduced into the furnace at about 65 lb. pressure per sq. in., and atomized with steam at a pressure of 65 to 75 lb. per sq. in., blown through an ordinary type of oil burner. The great speed at which this mixture went through the gas port caused it to act as an aspirator for the preheated air rising up the uptake leading into the gas port. This highly heated air was hit at right angles by the stream of vaporized oil and the two united under pressure and at great speed in a mixing chamber of small cross section.

These conditions approached the ideal for producing a flame of intense heat and perfect combustion. Here was given the idea for the development of the power of

*Assistant superintendent Lackawanna Steel Co., Buffalo.

(*Continued on page* 1555)

Broadening the Sales Field

Facts Concerning Seven New England Companies—Plans for Selling to the Individual Household—Direct Sales Plans for Articles for Personal Use

BY STERLING H. BUNNELL*

MANY of the ordinary terms used in business are words with present meanings derived from earlier use in quite different ways. Thus, we now "ship" goods over land by motor-trucks and trains, while passengers go "aboard" all sorts of conveyances other than boats. The common terms "producer" and "consumer" evidently referred at first to the cultivation and sale of food, but are now applied indifferently to steel mills and railroads, machine tool shops and metal-working factories, to indicate on the one hand the constructor, and on the other the purchaser and user, of things which may not be "consumed" in any reasonable sense.

ADAPTABILITY — adaptability—more adaptability — this is the burden of Mr. Bunnell's final paper in his review of the metal working industries, undertaken on behalf of THE IRON AGE. *This last of the five articles, of which the first appeared May 4, draws the distinction between those who serve the individual in his personal needs—and feel the least effects of "bad times"—and those whose work is normally paid for out of savings—and have to bear the bulk of the load of each depression. It is these latter—the manufacturers generally—who are here shown what some of their contemporaries have done to turn "bad" times into good.*

In times of depression the various kinds of consumers become sharply distinguishable. The grocers, barbers, restaurant workers, all who serve the individual citizen personally, find little if any reduction in their daily receipts. But the builders, steel workers, machinists, all whose work is normally paid for out of the savings of investors and added to capital, stand the whole of the difference betwen good and bad times. The 10 or 15 per cent of reduction in the total business done falls entirely on this class of producers, and for a considerable period the usual increase of national wealth may cease. But, no matter how bad business conditions may become, the average citizen must eat, and will buy more or less of whatever suits his personal fancy or helps in his daily round. Therefore, the manufacturer who makes goods which sell to the general public is likely to suffer less, from fluctuations in the volume of trade, than those other manufacturers who make the tools and equipment needed in his business.

This is the era of direct merchandising to the people. The hue and cry against mail-order houses has died out, and these have become firmly established in trade with those who can anticipate wants and pay cash on delivery. Chain stores are extending and growing more prosperous because of the wide distribution of their customers and the steady average of their total of purchases.

Manufacturers observing the economies effected and the steady volume of business obtained by direct selling over a large territory are turning, therefore, to the production of goods which can be sold to everybody at all times. This is the explanation of the widespread interest in the development of household appliances like washing machines, of radio telephones, self-playing musical instruments, automobile accessories and personal-service goods like flashlights, cameras and sporting goods. These articles are being manufactured in many cases by shops formerly used for very different products. The new lines have been taken up because they could be sold readily in a period when the standard lines were not in demand at all.

Household laundry machines gained a great popularity four or five years ago. Their general use was made possible by the production of small low-priced electric motors, and strongly compelled by the diversion of women from domestic service during and since the war. As with the vacuum cleaner, the washing machine business became over-popular, and competition became severe. The Knox Motor Co., Springfield, Mass., as the demand for the motor-trucks fell off, became attracted by the wide sales field for household appliances, but worked out its plans in a different direction. Laundry machines might be used by very many households, but only once or twice a week; but dishwashing is a household task of drudgery that goes on three times a day.

The Knox Motor Co. therefore undertook the development of the Holiday dish-washing machine, which involved the designing of several interesting mechanical details. This dish washer operates by pumping a spray of hot soapy water against the surfaces of the dishes as they stand in a wire rack within an inclosing chamber of metal. It was desirable to use the ordinary low-priced small high-speed electric motor already in the market in connection with vacuum cleaners. At its speed of nearly 9000 r.p.m., no centrifugal pump could be designed small enough to work within the limit of ¼ kw. of electric power, and no stuffing-box could be used that would not overload the motor by the friction of the packing. The problem was solved by using a screw-propeller 1½ in. in diameter, on a vertical shaft connected direct to the motor shaft by a loose connection permitting free alinement. As the pump is submerged in a small sump, it starts without priming. By actual test this pump delivers over 50 gallons of water per minute against a head of about 5 ft., and calculation shows that the propeller works without any slip whatever, the water behaving like a solid nut surrounding the screw.

The cover of the machine is of sheet metal divided into two unequal parts and hinged together. The hinge, shown in section, is formed by a cornice brake, and works without the use of any hinge pin. It also locks itself as either section is opened through a little more than 90 deg., so that the raised section forms an open lid resting steady in a nearly perpendicular position. The whole machine as illustrated stands on three legs, with casters. It takes hot water from any sink faucet through a short hose connection, and discharges its contents into the sink through a gooseneck outlet pipe controlled by a valve. No fixed plumbing is required, and after the dishes are washed and rinsed by the action of the pump, and allowed to dry by their own heat, the machine can be rolled on its own casters conveniently near the china closet and the

*Consulting engineer, New York.

dishes then transferred by hand directly to the shelves.

Another decided innovation for a shop devoted normally to heavy machinery has been made by the Bullard Machine Tool Co., Bridgeport, Conn. The Militor motor cycle is of a new type, having many of the features of the light automobiles or cycle-cars popular in Europe. The cycle proper has an understructure of pressed steel formed into a box, incorporating in one piece the oil pan, lower half of transmission case, front and rear spring bases, and support for the steering head bracket. The engine is a four-cylinder vertical four cycle, air cooled. There is a gear transmission with three forward speeds and a reverse; a multiple disk clutch, magneto and generator. The drive is to the rear wheel, through a propeller shaft with two universal joints, in exact correspondence to usual automobile practice. There is even a standard instrument board with speedometer, horn and light switches.

The White Insert Shows How the Hinged Cover of the Dish-Washing Machine Is Made and How It Works. A washing machine for metal parts was described at page 1080, THE IRON AGE, April 20

Having a frame so substantial, the Militor motor cycle is especially suited for use with a side car or a delivery body. These are readily attached or detached. The vehicle is stated to make an average of 50 miles to the gallon of gasoline, and 14,000 to 18,000 miles to a set of tires. The machine has a wide field of use, as a pleasure vehicle, a service car, or a light delivery truck, and so should be readily salable to the general public as well as for commercial use in trade and industry. The Bullard shops, of course, possess all the necessary facilities for making drawings, dies and fixtures, as well as the machines for the actual production of the parts of the motor cycle.

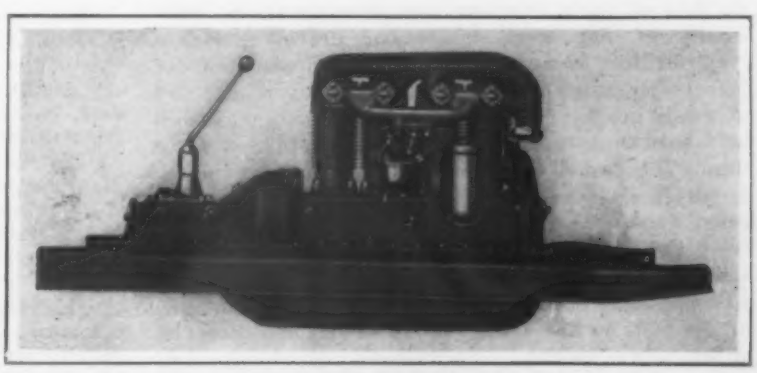
Some manufacturing plants regularly produce articles which are capable of being sold direct to the individual user. In such cases it is only necessary to develop the sales campaign in the desired direction. Billings & Spencer Co., Hartford, Conn., commenced some time ago to advertise in periodicals of general circulation, and by other means, the advantages of the solid engineer's wrenches which have long been an important item of the company's manufacture. An increasing demand is reported for these wrenches from all classes of users, who are learning to prefer the solid steel wrench, with its rigidity and firm hold on the nut, to the adjustable monkey wrench, which has hitherto been the universal appliance in every tool kit.

The Starrett Mfg. Co., Athol, Mass., says that a steady demand for its hand tools has continued throughout the business depression. This is remarkable, in view of the fact that machinists generally suffered from unemployment more severely than most other workers. Although a shop management will suspend the purchase of tools when business is bad, the individual makes up his mind and buys the device he wants, when he happens to want it.

The Eastern Machine Screw Co., New Haven, Conn., decided several years ago that its field of sale must be broadened. In former years, all makers of hand tools and hardware sold their entire output to jobbers, in large quantities, on terms of two per cent discount for payment within ten days. This gave the factory a steady rate of production and a quick turnover of capital. Gradually the jobbers came to ordering in smaller quantities, stocking less goods, and merely transmitting the purchase orders of their retailer customers to the factory for shipment on short notice. The factory thus had to assume the burden of carrying the stock through bad seasons into good.

Observing this effect, the Eastern company decided to put 350 names on its books instead of 20. The plan proved thoroughly successful, and the company now sells direct to a large number of retailers throughout the country. To retain and extend this trade, much care is given to developing new and superior articles for sale. The latest is a set of steel socket wrenches, with hexagon sockets formed by compressing the steel shell cold on a hexagon mandrel, instead of broaching the opening as usual. The wrenches are unusually strong. The complete set includes a universal joint coupling for use in cramped places, where the shank cannot be put in line with the center of the bolt to be unscrewed. The wrench sets are neatly packed in wooden cases suitable for automobile tool kits. A similar but smaller socket wrench set is made especially for users of Ford automobiles.

The Heald Machine Co., Worcester, has broadened its sales field by developing a cylinder grinding machine particularly adapted to use by automobile repair shops. This grinder follows closely the lines of the company's manufacturing grinders, so that much of the stock of parts for the latter, on hand at the time the depression in business arrived, can be utilized. There are thousands of automobile repair shops which can use these machines to advantage, and these are always busy, and ready to buy new tools for making repairs, regardless of fluctuations in the



Engine of the Militor Motor Cycle, Showing Its Pressed Steel Underbody and Inclosed Crank Case

demand for new automobiles. The Heald company has followed the trend of affairs in another way also, by bringing out at this time a rapid-production grinder for the manufacture of piston-rings. This machine has a magazine feed, makes 48 cuts per minute, and has a capacity of ten rings per minute, with a saving of about two-thirds in labor cost.

Reference was made in the preceding article of this series to the development of the business of the Winchester Repeating Arms Co., New Haven, into the personal service field. While sales possibilities are enormously increased by a nation-wide campaign to the consumer, the selling cost must necessarily be increased in proportion. It is possible for an agent to take orders in a local territory for a cost of five or ten per cent of his gross sales; but the marketing of a product nationally requires a margin often as high as fifty per cent. This margin may be called gross profit, but if so, it is badly named; it is in fact an item of cost—the cost of distribution. It covers the living cost of many employees, located at selling centers or traveling along routes, and rent, advertising, transportation and collecting cost in connection with the process of attracting the attention of millions of possible purchasers and putting the articles into their hands.

The success of the chain store has been in the universal use of selected methods, economies, and ways of promoting sales. The Winchester company knew that its great floor space left idle by the ending of the war could not be utilized except with the aid of a very far-reaching sales system. Accordingly, a complete retail marketing system was developed, by which Winchester stores were opened in the large cities, and agencies given in other cities to stores to be known as Winchester stores. There are already over 4000 of these sales outlets, and the number will eventually be doubled. They are linked together by an active sales organization at the Winchester main offices, where sales propaganda, window display, and store arrangement and appropriate seasonal advertising are developed for the benefit of all sales outlets. Representatives of the stores meet monthly in their own states, and annually at the Winchester offices in New Haven.

Such a sales organization becomes in itself a great unit, "productive" as an organ of distribution, and so available for handling many articles appropriate to its field of work. Cutlery, and sporting goods, principally of fine steel, would not provide sufficient material for filling all the wants of customers of Winchester stores, and accordingly many other lines of goods are handled, such as sports clothing, household hardware, baseball and football supplies and the like. The two Winchester organizations, the manufacturing and the selling, are thus independent to a great extent, and their successful operation will involve two entirely different types of successful management. The combination should be as nearly free as conceivably possible, from the effects of fluctuations in demand, on the total volume of business done by either.

There is manifestly a very real and very general trend toward the manufacture of articles for personal use or gratification, and their sale by the manufacturer direct to the ultimate purchaser. There is far too much expense connected with distribution as it has been carried on, involving as it did the transfer of ownership from maker successively to wholesaler, jobber, retailer, and final purchaser. The chain store performs the duties of the three intermediaries at much less cost. The mail-order house even enters the manufacturing field to produce some of its goods for sale. The cooperative organization comprises the complete distribution chain from the shipping platform of the factory to and including the final purchasers. It is only to be expected that, whenever possible, the manufacturer, seeing the advantages to be gained, will develop his own distribution system, reaching all the way out to the one who always has wants, and always finds means to fill them—the much-discussed Ultimate Consumer.

Cost of Living About Stationary

Monthly figures of the Bureau of Labor Statistics show the wholesale prices of all commodities during April to be 52 per cent above the average for 1913, compared with 52 per cent in March, 51 per cent in February, 48 per cent in January and 49 per cent in both December and November. Three of the nine individual groups showed a rise in April compared with March, as shown in the table; five items recorded slight recessions.

In spite of recent increases in iron and steel prices, metals and metal products, which now stand at 17 per cent above the 1913 average, are far lower than any other group listed. This item is now 10 points below farm products, and more than 20 points below the others. The highest item on the list still continues to be housefurnishing goods, which, together with building materials, are more than double their 1913 prices.

While metals are only 17 per cent above their 1913 level, the average of all the others is more than four times as far above the 1913 level.

Our table shows the figures for the two most recent months and for April, 1921, and the peak in 1920. It shows also the amount of liquidation, between the 1920 peak prices and the present, of the excess of the peak prices over the average of 1913. Metals have been liquidated 82.1 per cent, farm products 81.5 per cent, food products 80.2 per cent and the other less than 70 per cent.

Index Numbers of Wholesale Prices, by Groups of Commodities
(1913 equals 100)

	1920 Peak	1921 April	1922 March	1922 April	Liquidation, Per Cent
Farm products	246	115	128	127	81.5
Food, etc.	287	141	138	137	80.2
Cloths and clothing	356	186	182	181	68.4
Fuel and lighting	284	199	183	187	52.7
Metals and metal prod.	195	138	114	117	82.1
Building materials	341	203	202	201	58.1
Chemicals and drugs	222	168	159	160	50.8
House-furnishing goods	371	274	213	211	59.0
Miscellaneous	247	154	153	152	64.6
All commodities	272	154	152	152	69.8

Heyl & Patterson Re-enters Pulverized Coal Field

Heyl & Patterson, Inc., Pittsburgh, which was in the pulverized coal business for several years, until the death of E. C. Covert caused a suspension in this field, has again taken up business in pulverized fuel burning by placing C. F. Herington in charge.

Mr. Herington has devoted nine active years in designing, selling and installing pulverized coal plants for all metallurgical furnace and boiler installations and is well known in the field as being the author of "Pulverized Coal as a Fuel," a book now in its second edition.

The Heyl & Patterson pulverized coal system used is known as H. & P. sealed circuit system of pneumatic distribution, and also the air transport system for conveying pulverized coal long distances by compressed air.

Open competitive examinations for junior engineers on May 24, July 5 and August 23 have been announced by the United States Civil Service. The following subjects may be taken: electrical engineering, mechanical engineering, civil engineering, chemical engineering, ceramic engineering, radio engineering, engineering of materials. Vacancies in the Bureau of Standards, Department of Commerce, for duty in Washington, or elsewhere, at salaries of $1200 to $1500 a year, will be filled from these examinations. Application should be filed at the Federal building, in one of the larger cities for blank No. 1312.

A New Textile Machinery Foundry

Machine Molding and Machine Sand Handling Are Features—Old Foundry Transformed Into Cleaning Room

UNDER construction and re-arrangement for something over two years, the new foundry and cleaning room of the Saco-Lowell shops at Newton Upper Falls, Mass., have recently been put into complete operation. The problem was that, in one of the lowest parts of the property, and approximately in its center, was an old foundry building which could not expand, as it was hemmed in on all sides either by storage yards or buildings. Ventilation was poor, light was poor and production per man was low.

Collaborating with Lockwood, Greene & Co., Boston, the H. M. Lane Co., Detroit, as foundry engineer, made a general layout for a new plant. After the new plant was built, the old foundry was revamped and made into a good cleaning room, with the result that castings now have a straight line travel from the foundry to the finished machine in the shop. On account of the congestion under the old layout, all castings had to be lifted from the foundry to the pickle house, by the careless handling of a grab-bucket or magnet than either a metal or concrete structure.

There are two charging scales on the charging platform, and two cupolas are now installed, with provision for a third. There is a sufficient number of pig iron cars to permit making up practically an entire charge and setting it back on the platform before charging starts. This also makes it possible to have only one outside door open at a time, thus minimizing the amount of cold air that enters the charging platform. The platform has a creosote block floor, laid on reinforced concrete, and a concrete tile roof supported on steel trusses.

Both cupolas were made by the W. W. Sly Co., Cleveland. Their blowing unit is located on a mezzanine floor at the rear of the cupolas, and under the charging bin. A portion of this mezzanine floor is occupied by a repair and maintenance shop for monorails and other electrical equipment. The drop from

General View of Foundry and Yard, the New Foundry Being at the Left, with a Further Bay Outside the Range of the Photograph. The supply yard for storage of coal, coke and metal is under the crane in the center, with the bins on the charging platform level protected by the projecting canopy

whence they passed down into the cleaning room and then into the shop. Under the new arrangement it is a down-grade proposition, until castings land in the machine shops.

In the general view, the foundry proper, at the left, with the Pond type roof, is a two-story structure with the foundry on the upper floor, and sand handling on the lower floor. In the center can be seen the storage yard with the yard crane and the melting unit. In the back-ground, at the end of the storage yard, is the new pickling building, and at the extreme right can be seen one corner of the old foundry, which has now been remodeled as a cleaning room. The yard crane was furnished by Pawling & Harnischfeger Co., Milwaukee.

Provision is made for the ultimate extension of the yard crane runway toward the foreground of the picture, and a shifting of the incoming track so as to bring it parallel with the crane runway for the entire length. At the same time, the foundry can be extended in the same direction to approximately double its present area.

Stock bins, on the charging platform level, are filled by the yard crane. Particular attention is called to the canopy roof extending over the bins, and protecting them from rain. The bin walls are of heavy timber construction, resting on reinforced concrete, as experience has proved that this construction stands up better under the bombardment of pig and scrap the cupolas passes directly through the floor of the foundry proper to the ground floor, where it lands in bins having three permanent sides. This gives the drop ample time to cool off, and the men can then clean it up at their leisure the next day. The slag spouts on the cupolas being arranged at the rear, the slag passes through holes in the foundry floor and accumulates on the floor below, separate from the drop.

In front of each cupola is a small receiving ladle, which is used simply for cutting the stream between monorail ladles and hand ladles, so as to avoid the use of a bott-stick as much as possible. The foundry is operated continuously, the first iron coming down between 8 and 9 in the morning, pouring continuing until noon, when a blank of coke is sent down and the cupola shut off until afternoon. The blast is then turned on and the pouring continued until quitting time. Much of the iron is now taken away by the monorail in special carriages as shown, though some of it is taken in hand ladles. It is expected that this latter will be discontinued in the near future.

In the room inclosing the drop pen is situated also the water tumbling barrel for taking care of the drop and recovering the shot iron. Iron and coke saved are taken on the elevator from this level to the charging floor, or the coke may be wheeled to the opposite end of the building and used for firing the core ovens. Refuse from this floor is taken through a door in the

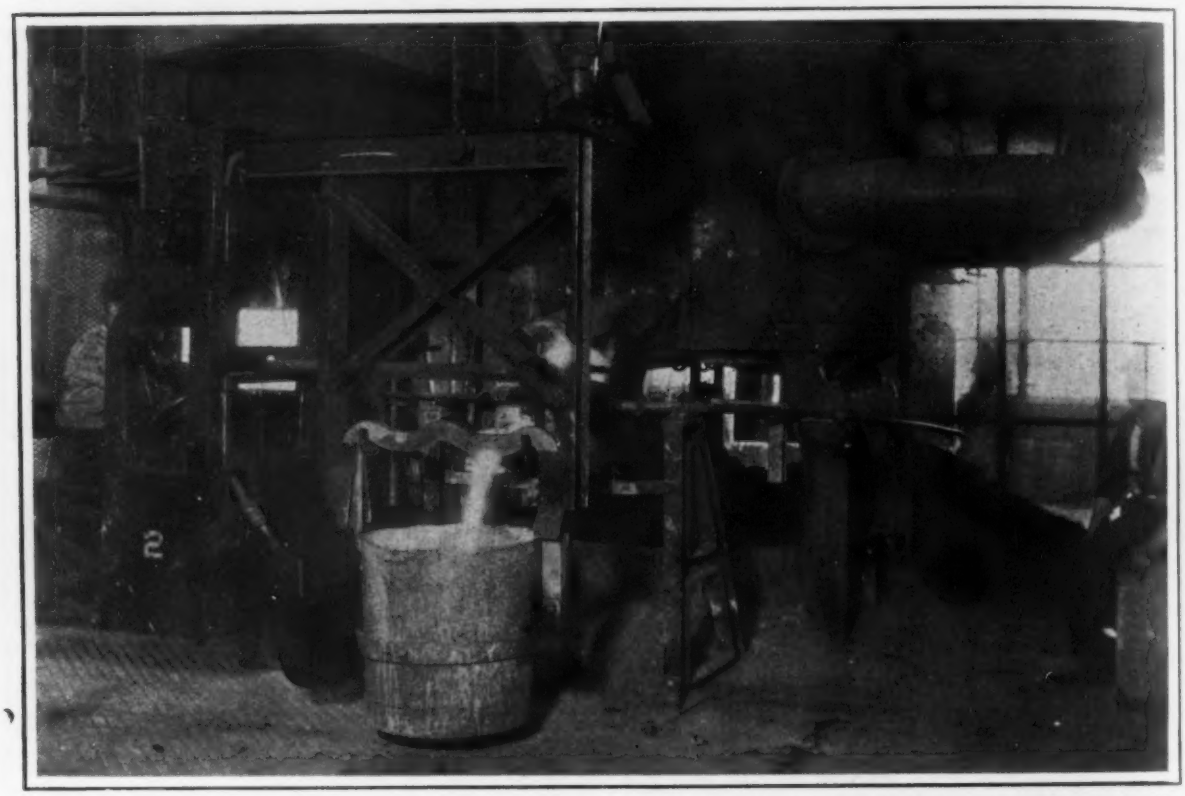
Wood and Metal Pattern Shop in Service End of Building

floor of the foundry, the tempered core sand being taken up the elevator for delivery to the core makers.

Virtually on the third floor of the building in the service end, the core ovens are fired from a firing pit two floors below, on the level of the first or sand mixing floor of the foundry. Provision is made for the use of forced draft on these ovens when the output increases beyond the amount which the natural draft with the exhaust fan will take care of, but with the two ovens installed and the present output the forced draft is not necessary.

For drying ladles another oven was built adjoining the cupolas, and this also is fired from the floor below. Both ovens are fired with coke from the cupola drop, or with fine breeze coke from the yard coke bin.

As the exterior of the service end of the building and the exterior of the pickle house face one of the principal automobile roads west of Boston, these two



Cupola Spout with Receiving Ladle and Man-Riding Ladle Car. The drop from the cupola falls through the opening in the floor, between the cupola legs, to the floor below, thus removing all of this material from the molding floor level

end of the building to a point under the monorail and thence handled to the refuse piles in the yard, or it can be taken up on the elevator and out into the yard on the yard level, or up on the elevator to the second floor and then out into the yard at the rear of the building, over a special ramp.

The core department is located at the opposite end of the building from the melting unit, in what is known as the service building. This structure, about 50 ft. wide, extending across the entire end of the foundry, houses the foundry office, time clocks, lunch room, locker room, wash and toilet rooms, pattern shop, maintenance machine shop, stock room and core room. On the lower level, or the level of the first floor, under the foundry is a large storage room for flasks, bottom boards and general foundry supplies. Beneath the wood and metal pattern shop is a machine shop.

Benches of the back opening type, with sand hoppers, are provided for the core makers. The cores are baked in two auxiliary air forced draft core ovens made under the Lane patents by Holcroft & Co., Detroit; provision is made for the future installation of a third oven. It is also possible to take a portion of the pattern shop for core room, should this be necessary some time in the future. Core sand mixing equipment, consisting of a Standard Sand & Machine Co. batch mixer, is situated on the regular sand mixing

Core Room on Third Floor of Service Building. The ovens in background are fired from the first floor, thus avoiding the necessity of bringing fuel to the upper floor or hauling ashes away from it. Firing is constantly under the observation of the man in charge of core sand mixing

faces were given special architectural treatment to make good looking buildings of them, at small additional cost. The service portion of the building is of flat slab construction, while the concrete work of the balance of the plant is of beam construction.

Only a portion of the sand handling equipment, which is ultimately going to be put into this plant, has been installed at present. One bay of the shop is devoted to the making of a certain line of heavy castings described in another article. In the other bays the work varies from castings weighing a fraction of a pound to those weighing approximately 1000 lb., but a practically universal system of sand handling has been evolved. The building is divided into four principal bays, the two outer or single bays having a space of 33 ft. from the wall to the columns and the two inner or double bays having a width of 52 ft.

In the floor at "G" can be seen a grate through which the sand is dumped when the molds are shaken out. The general arrangement of sand handling is the same for all types of machines, though the spouts or gates on the sand bins may be placed closer together, in the case of smaller machines, and naturally a larger number of molds will be put up before pouring.

The second stage of the sand handling is clearly shown in another view, taken on the first floor of the foundry. The shake-out bin "A" is located under the shake-out grating "G", and beneath each bin is a pan feeder "P", which can be made to discharge the sand into the boot "B" of an elevator "E-E". This elevator is located on a car on a track running between the main columns. The car is manipulated so as to bring the boot of the elevator beneath the end of the pan feeder, and then the shuttle conveyor shown at "S"

Typical Molding Floor for Heavy Work. Tempered sand is in overhead bins with undercut gates, as shown at *A-A*. Molds made on the machines *C* and *D* are placed on the floor for pouring, and then shaken out through shake-out grating *G*, the sand passing down into a bin below the floor

Between bays there are two sets of columns, set 8 ft. apart, the space between these columns being designed for the sand handling equipment, which consists of a series of bucket elevators and bins for the delivery of sand directly to the molds. In the foundry floor are arranged a series of shake-out bins, or shake-out grates through which the sand is passed to shake-out bins beneath the foundry floor proper.

One view shows the molding floor for the carding machine sides, with two molding machines for the cope and drag, the drag being arranged with stripping plate pattern, while the cope is essentially a flat-back. Sand from the under-cut gates "A-A" for the sand bins, flows directly into the flasks on the molding machines, and is distributed by the molders, and in this case hand rammed. A small traveling crane overhead serves to pick up the molds by means of a porter bar "B", from which can be seen hanging one of the drag flasks "F" just as it has been lifted off the machine, ready for placing on the floor. The pattern on the drag machine "D" has been lifted after the mold was taken from the machine, so as to show the pattern on the machine. The cope machine is at "C" and this is a flat-back proposition.

is run forward until its end will discharge sand into the boot of the elevator "F", at the left of the picture.

This shuttle conveyor is mounted on a small frame "D" which is traversed back and forth across the car "C" by means of a hand winch on the working platform of the car, and the electrical connections are so arranged that the car cannot be traversed along its track until the shuttle conveyor has been drawn back, so that it will not interfere with the building columns. When the sand mixing car has been lined up, the elevator "F" is started first, then the shuttle conveyor "S" and the mixing machine "M", next the elevator "E-E", and then the pan conveyor "P".

On the mixing machine "M" is arranged a water hopper "W" which always lands directly under a water connection, as shown, whence the attendant in charge of the machine introduces the proper amount of moisture for tempering the sand. The sand, as it flows into the boot of the first elevator "B", is in plain sight of the operator, so that he can see how dry it is. The sand mixing machine in front of him is so located that he can take out a handful of sand if he wants to, as is also the shuttle conveyor, so that he can tell the

condition of the sand as it passes through the system. The sand mixing machine "M" is simply one of the Standard Sand & Machine Company's machines with its rotating sieve so mounted as to form a unit in the series.

One of these mixing machines takes care of the sand for an entire bay of the foundry, and provision has been made at one point of the plant to take the machines off the track and interchange them in case of a break-down, or so that a spare machine can be held in readiness for replacing break-downs. But each unit is of such simple character that it can be completely inspected, and aside from electrical troubles there should never be occasion for delay on account of machines breaking down during working time; with modern rugged motor construction, this electrical difficulty should be reduced to a minimum.

As textile machinery castings are of such a nature that they could not be passed through chutes from the second-floor to the first floor, as is the case in many continuous foundries of the two-story type, they had to be picked up in the gang-way and carried out. This was accomplished by means of a monorail system, which carried them over to the pickle house. As will be seen in the cut, the monorail, coming from the foundry through the door shown at the rear, loops this department. The pickle floor itself in the length of the building is practically level but, as the building was situated between the foundry on one level and the cleaning room at the other, it was necessary to construct a trucking ramp at one side of the room. The grade of this ramp is of no importance, as all heavy trucking is down hill.

The pickle room has an under-slung crane in the center, which is used for handling castings on the pickle floor. Small castings come in from the foundry in tubs; the larger ones, two of which can be seen entering from the foundry, come singly. They are deposited on the floor at the right, and the smaller castings are piled up on the wooden trays shown. These trays are then picked up with the under-slung crane, set down on the pickle floor, and drenched with the pickling solution. After this has had sufficient time to act, the whole tray is picked up and carried to the washing floor, in the foreground, where the castings are washed free from acid.

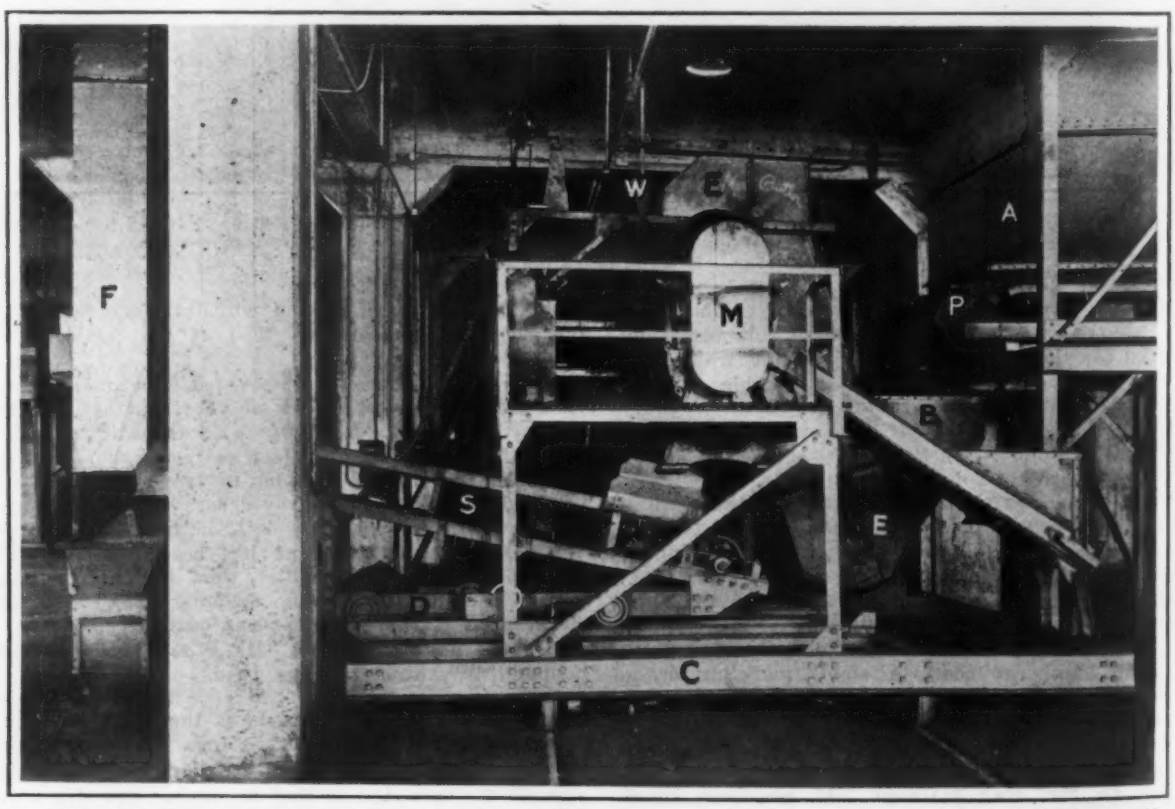
After washing, the castings are piled into large trucks, with sides and caster wheels. The trucks are then shoved under the monorail, picked up and taken to the cleaning room. The larger castings are picked up individually or in pairs by the monorail and also taken to the cleaning room. The larger cylinder castings, shown in the center of the picture, are pickled by rolling them back and forth in a trough containing pickle solution. The floor of the pickle house is of concrete construction, and the parts liable to be subjected to the most acid were protected with pitch and sheet lead, then more pitch, then vitrified brick laid in pitch.

Beyond the pickle house the monorail runs over the boiler house to the old foundry. A new concrete floor was placed in this department, which was arranged for cleaning, sorting, and the storage of castings on their way to the shops. The monorail crosses the back end of the plant and deposits the castings on the floor. Those to be tumbled are brought down the left side of the building past the tumbling barrels. In the tumbling barrel line-up are several special barrels made for tumbling intricate castings, which are piled in to fit very closely, and then are tumbled by means of the stars which tumble around or surge in between them.

In the center of the room under the monitor, where there is the best light, are placed the chipping and sorting benches, and at the right of the benches, opposite the tumbling barrels, is a painting department where such castings as require dipping are given their first coat of paint, before they are sent to the machine shop.

The Saco-Lowell shops are pioneers in the stripping plate type of machine as applied to textile machinery castings, and when the new foundry was put into commission, together with the special machines which form the subject of another article, it became practically a 100 per cent machine molding unit. At present only one complete unit of this system is installed and in operation. The balance of the plant is operating as a plain hand foundry, keeping the sand all on the floor. The sand handling equipment, bins and sand car were furnished by the R. W. McIlvaine Co., Chicago.

The shift from the old shop to the new was made at the beginning of last year, and work was going on simultaneously in both plants through the hottest



Traveling Sand Mixing Unit Under Foundry Floor. Sand from the shakeout grating *G* (another view) lands in the bin *A* and is fed by the pan feeder through the mixing machinery on the car *C*. Tempered sand is delivered by the shuttle conveyor *S* to the elevator *F*, which in turn delivers it to the bins above the molding floors

Castings Come into the Pickle Building from the Foundry Through the Door in the Background, Being Brought in by the Monorail. The floor in the background is used for pickling and that in the foreground for washing. The pickle floor is served by an underslung crane. After pickling, the castings are transported to the cleaning room by the monorail

weather. There were days when it was almost impossible to turn out work in the old shop, but the new shop is ventilated so perfectly that it made a better working proposition than the saw-tooth roof machine shops, or other parts of the factory, and a marked increase in the daily output of the men was seen as they were brought across to the new shop, even though no inducements were made in the way of additional wages, piece prices, sand handling equipment, or any similar means frequently employed. This increase was due solely to better light, better ventilation and better general working conditions.

People frequently talk of a shop by saying "what is the melt?" or "what is the output per square foot?" but such figures are misleading. Textile machinery is largely composed of light castings, the production of which takes up a large floor space. With the present standard handling equipment installed, this plant has handled between 80 and 90 tons a day of melt, with one cupola lined to 54 in. diameter. It is the general opinion of the men in charge of the plant that, with the balance of the sand handling equipment installed and the weight of the castings per piece remaining essentially as now turned out, the present plant is capable of an output of approximately 150 tons per day.

This plant has proved its worth from a money saving standpoint, but that is not the only thing to be said in its favor. It has also proved its worth as a good, clean, wholesome place for men to work, and has shown conclusively that it is easier to hold good molders in such surroundings than in old type shops.

Ohio Manufacturers Will Meet at Youngstown

James A. Campbell, president Youngstown Sheet & Tube Co., is handling arrangements for a special meeting June 7 at Youngstown of the Ohio Manufacturers' Association. Herbert Hoover, Secretary of Commerce, and James A. Emery, general counsel of the National Manufacturers' Association, will address the gathering. A business session will be held in the morning, while the addresses will be given in the evening.

Valley steel makers are planning to entertain a large number of Ohio manufacturers. Assisting Mr. Campbell in arranging the gathering are Jonathan Warner, president Trumbull Steel Co., Warren; L. J. Campbell, president Electric Alloy Steel Co.; T. J. Bray, president Republic Iron & Steel Co.; James H. Grose, president Brier Hill Steel Co.; George W. Knotts, Youngstown district manager United Engineering & Foundry Co.; Severn P. Ker, president Sharon Steel Hoop Co., Sharon, Pa.; Shirley S. French, vice-president and general manager General Fireproofing Co., and Fred A. LaBelle, secretary of the Youngstown Chamber of Commerce.

Winchester Dealers to Meet in New Haven

On what a scale the Winchester Repeating Arms Co. has arranged to instruct and entertain the distributors of its products is shown in the following brief summarization of the program of the second annual convention of the National Association of Winchester Clubs which will be held at New Haven, June 26 to 29, inclusive. On the morning of June 26 addresses will be made by officials of the Winchester Repeating Arms Co. and by others. On that afternoon and on Tuesday and Wednesday, the various groups of Winchester dealers will meet in conference sessions, tour the shops, see motion pictures showing how Winchester's standard products are manufactured, and inspect the complete line of Winchester products which will be set up in a display room at the plant. On Thursday, addresses will be made by representatives of the factory and sales organizations and by Winchester dealers from various parts of the country. During the morning an open forum will be conducted by Sales Manager Maycumber of the Winchester company, and the afternoon will be enlivened by awarding to the holder of a lucky number a one-ton truck.

On Sunday evening an organ recital will be given on one of the largest organs in the world in Woolsey Hall, Yale University. On Monday evening Winchester people will be entertained at a cabaret, dance and social get-together at the Arena, New Haven's amphitheater. On Tuesday evening the scene will shift again to Woolsey Hall, with a seating capacity of about 3500, where the mysteries of radio will be explained and where there will be a special entertainment and moving pictures designed particularly for Winchester's guests. On Wednesday afternoon the business of the convention will be sidetracked in favor of a field day, clam bake and shore dinner at Lighthouse Point. On Thursday evening the company will tender a banquet to Winchester dealers and their families in the Yale Dining Hall, more frequently called the Commons.

The National Enameling & Stamping Co. has started the construction of a three-high plate mill to cost $300,000. The present plate mill at Granite City, Ill., will be used exclusively for roughing. The installation of the new facilities will make necessary the erection of a 100-ft. extension to the present plate mill building.

Metal for Cast Iron Car Wheels

Three Distinct Compositions Embodied in One Mass: White, Gray and Mottled—Care Necessary in Blending Cupola Charges

BY Y. A. DYER*

CAR wheel metal is a representative specimen of the physico-chemical properties of cast iron in that it combines, to a marked degree, the structural and chemical constituents of three distinct compositions in one metal mass. To neglect balancing these compositions, and subsequent rational treatment by annealing at critical temperatures, in the process of manufacture may prove disastrous to the service for which cast iron wheels are designed. From these points of view, and the further fact that the metal must, of necessity, intimately blend the most stable composition of cast iron (gray iron), the most unstable composition of cast iron (white iron) and the intermediate composition (mottled), there is little wonder that such a metal combining this ternary structural composition requires par excellence in skill of production—necessitating careful coordination of chemical and physical factors to meet the problems involved in molding, cupola practice, mixing, melting, pouring and annealing, if there is to be expected a cast iron wheel of maximum service record.

Therefore, the car wheel metallurgist is called upon to put into practice his best metallurgical skill in mixing metals, knowledge of cupola practice, thermochemistry of reactions and thermophysics of elements, alloys and chemical compounds from time of "blast on" until the last wheel is poured; and then from the time wheels are shaken out, put into annealing pits and placed on floors for cooling below recalesence point.

Mixing of Metals

To formulate intelligently a car wheel mixture requires first a thorough understanding of enuring benefits of elements and compounds, both definite substances and definite proportions—and their effect on the heterogenous mass; also their influence on annealing. It is also helpful to be familiar with the form in which elements are present and how they are arranged. By aid of chemistry and physics, pyrometer and microscope, these phenomena occurring in cast iron may be fairly well understood and scientifically applied to produce essential requirements for a serviceable casting.

The silicon content in car wheel metal should be low enough to permit the carbon to remain practically wholly in the iron-carbide, or combined form, in the tread and face of the flange, yet be high enough not to interfere with a reasonable separation of graphite in the plate or gray portion. Silicon remains dissolved in iron chiefly as iron-silicide (FeSi). If too high, the silicon will force out or exclude carbon from solution with iron as iron-carbide. From 0.60 to 0.70 per cent silicon, or 1.80 to 2.10 per cent iron-silicide, constitutes a safe working limit for car wheel metal—requiring a total of 0.75 to 0.85 per cent silicon in the mixture. If sufficient manganese be present in the mixture, as it passes through the cupola, not more than 0.15 points of the silicon will be oxidized.

Excessive sulphur renders the annealing process slower. Sulphur may occur in the metal as iron-sulphide (FeS) or manganous-sulphide (MnS). Iron-sulphide has a marked effect in reducing strength and inducing checking by its tendency to decrease fluidity and increase shrinkages—and forms a mesh-like structure surrounding the iron grains. When manganese is present in sufficient quantity these mesh-like structures break up throughout the mass of metal, by reason of the formation of manganous sulphide. While the glass-like or stratified effect which sulphur produces in the metal mass may be beneficial to the tread portion of the wheel, its effect on the gray portion accentuates brittleness, whereas toughness is required.

Sulphide of iron also favors the formation of combined carbon, while manganous sulphide does not. Enough manganese should be present to combine with the sulphur as manganous sulphide, and thereby minimizes the formation of iron sulphide. From 0.10 to 0.12 per cent sulphur constitutes a safe limit for sulphur in the mixture. This means that not more than this amount should be present in the mixture, for at least 0.02 per cent will be ordinarily absorbed from the coke, making a total of 0.12 to 0.14 per cent sulphur in the wheel, or 0.32 to 0.38 per cent manganous sulphide.

Phosphorus produces 6.4 times its own weight of iron-phosphide (Fe_3P), and forms 10 times its weight of "Steadite," or iron-phosphide in iron—a binary eutectic which melts at 1796 deg. Fahr., and exists in irregularly shaped cells with glazed walls. On account of low melting point, or low fusing point of the eutectic, it is the last liquid portion of the metal mass to solidify.

When present much above 0.40 per cent in a cast iron wheel, the phosphorus is likely to cause segregation and sponginess by reason of the eutectic solidifying last, and in this way interfere with strength and soundness of wheels. This is particularly true of castings which have marked uneven weight sections joined together, where draws and spongy spots are likely to occur. Between 0.35 and 0.40 per cent phosphorus, or 2.24 to 2.56 per cent iron-phosphide or 3.50 to 4.00 per cent "Steadite", should create no serious trouble in a wheel by reason of the presence of phosphide eutectic. To come safely within these limits the mixture should not contain in excess of 0.38 per cent phosphorus, as some small gain is likely to occur on remelt by concentration or absorption from coke, etc.

Manganese is the most readily oxidized element; and its oxidation is desirable for two good reasons—to beneficiate the metal mass by its desulphurization and deoxidizing influence, and to keep the total manganese in the wheel within a rational annealing range. Silicon does not begin to oxidize until a large portion of the manganese has been fluxed. Therefore, if an iron reasonably high in manganese be used in a mix, its oxidation will protect the silicon from excessive oxidation and consequent lowering below caclulated percentage needed in the wheel—thereby minimizing the necessity of "juggling" with molten iron in an effort to raise the silicon.

Manganese neutralizes sulphur, and is neutral in its effect on iron. A wheel mixture containing 0.12 per cent sulphur requires 0.21 per cent manganese to neutralize it, forming 0.33 per cent manganous sulphide. A total of 0.50 to 0.65 per cent manganese present in the molten iron should constitute a safe working limit. Any amount in excess of combining weight with sulphur will combine with carbon as manganese-

*Metallurgical engineer, Cherokee Engineering Co., Birmingham, Ala.

carbide (Mn_3C) and pass to the cementite structure. The total amount of manganese required for the mixture will be approximately 0.65 to 0.80 per cent, if iron and scrap are to supply the manganese; or more, if 80 per cent ferromanganese be used to impart the requisite amount. If practicable, however, it is more desirable to use an iron which carries enough manganese for deoxidizing and desulphurizing, and for combination with carbon in the iron.

Carbon is the controlling element in cast iron. All other elements have their effect on carbon, with the possible exception of phosphorus. Manganese and sulphur have a decided tendency to raise the ratio of combined to graphitic carbon, while the lowering of silicon has a similar effect. If there be a large quantity of easily fused iron-phosphide eutectic present (phosphorus in iron, say, 0.80 to 1.50 per cent) in a metal mix, then its low melting point would create a very fluid iron which might produce more separation of graphite. However, in a car wheel mixture, the phosphorus is low enough to prevent such action. The total carbon in car wheel metal should not be too low, on account of its interfering with reasonable fluidity and the formation of sufficient free cementite for chilled tread and flange portions.

Carbon must be looked to for fluidity, because silicon and phosphorus are low in wheel mixtures. While the element carbon is more stable, by reason of metal being in contact with the solid incandescent carbon of the coke, yet if there be not sufficient manganese present in the mixture to pass through the cupola, the total carbon is likely to be lowered in the casting, on account of the diluting effect of steel scrap, coupled with loss by oxidization. In such case it would thereby cut down the formation of a large quantity of cementite which is necessary for chilled portions of the wheel, as well as for the formation of pearlite of proper proportion in the gray sections. Total carbon between 3.25 per cent 3.60 per cent, with 0.70 per cent in the combined state, or 10.20 per cent iron carbide, constitutes a safe working limit for car wheel metal.

Mixture

Assume the materials on hand, with which to make a car wheel of approximate analysis: Si, 0.60; S, 0.14; P, 0.40; Mn, 0.65 per cent. Also assume that it is desired to use 80 per cent old wheels and foundry scrap, 8 per cent steel scrap and 12 per cent pig iron. The analysis of the needed pig iron (designated as "X" iron) may be found by calculation.

	Silicon	Sulphur	Phosphorus	Manganese	Total Carbon
Old wheels and foundry scrap	0.65	0.14	0.40	0.65	3.40
Steel scrap	0.15	0.04	0.10	0.60	0.60
"X" pig iron	1.82	0.03	0.43	1.93	3.70

Iron charges are to be 7000 lb. for a 90-in. cupola. Therefore the silicon specification will be $(0.60 + 0.15) = 0.75$ per cent, or $(0.75 \times 70) = 52.5$ lb. per charge; phosphorus specification permitted in mixture to be 0.38 per cent, or $(0.38 \times 70) = 26.60$ lb. of phosphorus per charge; manganese needed in mixture will be $(0.65 + 0.15) = 0.80$ per cent, or $(0.80 \times 70) = 56$ lb. per charge.

	Per Cent	Charges, Lb.	Silicon, Lb.
Old wheels, etc.	80	$5600 \times 0.65 \div 100 =$	36.40
Steel	8	$560 \times 0.15 \div 100 =$	0.84
"X" pig iron	12	$840 \times x \div 100 =$	15.26
			52.50

$$x = \frac{15.26 \times 100}{840} = 1.82 \text{ per cent silicon needed in "X" iron.}$$

	Per Cent	Charges, Lb.	Phosphorus, Lb.
Old wheels, etc.	80	$5600 \times 0.40 \div 100 =$	22.40
Steel	8	$560 \times 0.10 \div 100 =$	0.56
"X" pig iron	12	$840 \times x \div 100 =$	3.64
			26.60

$$x = \frac{3.64 \times 100}{840} = 0.428 \text{ per cent phosphorus in "X" iron.}$$

	Per Cent	Charges, Lb.	Manganese, Lb.
Old wheels, etc.	80	$5600 \times 0.65 \div 100 =$	36.40
Steel	8	$560 \times 0.60 \div 100 =$	3.36
"X" pig iron	12	$840 \times x \div 100 =$	16.24
			56.00

$$x = \frac{16.24 \times 100}{840} = 1.93 \text{ per cent manganese needed in "X" iron.}$$

Inasmuch as it may be difficult to secure an iron containing 1.93 per cent manganese, ferromanganese may be used to supply the deficit. An iron analyzing 1.00 per cent manganese is not uncommon on some markets. By using 1.00 per cent manganese pig iron, the 0.93 per cent deficit may be supplied by using ferromanganese. This would require $(0.93 \times 70 \times 0.12) = 7.8$ lb. of manganese per charge, or would require $(7.8 \div 0.80) = 9.75$ lb. of 80 per cent ferromanganese per charge, of 7000 lb. of metal. However, inasmuch as approximately 40 per cent of the ferromanganese is usually lost by oxidation, $(9.75 \div 0.60) = 16.25$ would be necessary.

In passing through the cupola, steel will absorb carbon from coke to the extent of approximately 2.00 per cent, therefore the carbon in melted steel will be about 2.60 per cent—hence total carbon in metal will be approximately:

	Total Carbon, Per Cent
Old wheels, etc.	$0.80 \times 3.40 = 2.72$
Steel scrap	$0.08 \times 2.60 = 0.21$
"X" iron	$0.12 \times 3.70 = 0.45$
	3.38

The sulphur in total mixture will be as follows:

	Total Sulphur, Per Cent
Old wheels, etc.	$0.80 \times 0.13 = 0.1040$
Steel scrap	$0.08 \times 0.04 = 0.0032$
"X" iron	$0.12 \times 0.03 = 0.0036$
	0.1208

Sufficient manganese and lime should be present to counteract excessive sulphur, which might otherwise be absorbed from the coke. It is possible materially to flux the excessive sulphur as calcium sulphide and manganous sulphide, thereby passing it to the slag.

Cupola Practice—Melting Process

It is important to note that car wheel cupola practice differs materially and essentially—in the matter of extreme care and caution—from average gray iron cupola practice. From 80 to 90 per cent of each charge is composed of low melting point materials, hence the coke used should be as uniform as practicable in chemical and physical qualities; and cupola charging and operation should be uniform and rational, to prevent a disturbance of equilibrium.

It is usually the aim of operator to "fix" the chill and watch every detail to prevent its "upset" during a heat. Any material variation in sulphur content of the coke may upset the chill, or a variation in its physical characteristics, which disturbs the melting zone, may also upset the chill.

The sulphur, in 75 to 80 per cent of the metals used in charges will range from 0.12 to 0.14 per cent—sometimes higher—therefore there must be used from 20 to 25 per cent of low sulphur metals and low sulphur coke to hold the sulphur range in new wheels between 0.12 and 0.14 per cent. With the very best application of cupola practice 0.025 to 0.03 points of sulphur will enter the molten metal from coke analyzing 1.00 per cent sulphur. Any decrease of sulphur in the coke will reflect lower sulphur in the metal mixture; and this point has to be watched more closely in wheel practice than in ordinary gray iron practice.

It is necessary to accumulate large quantities of molten metal in the mixing ladle—either by holding in the cupola until ready to tap, or by continuous flow—and the iron must be superheated to a rational degree, in anticipation of subsequent irregularities which may require it to be held in the mixer for an extended

period of time to adjust chill, etc. When once tapped, there is no opportunity to add heat.

Therefore, the practicability of the wheel melting process depends on numerous vital factors which are not so strictly adhered to in gray iron founding. These various features demand the very best melting conditions. To accomplish satisfactory results the coke bed should be regulated by measure, to come flush with the ideal melting zone—the point where there exists at least 65 to 70 per cent carbon dioxide gas—then enough coke, by weight, must be supplied for intermediate charges to keep the melting zone stable. This last mentioned feature requires iron charges, for any size cupola, to be of proper uniform weight throughout the charging period, so that they may be melted and away from the melting zone area in time for intermediate coke charges above them to replenish the bed before it shall have burned below the "true zone of fusion." Otherwise a lowering of the melting zone will result, and the metal will be subjected to oxidation.

This means that the melter should know the chemical and physical characteristics of the coke being used, and the necessary volume of air to be supplied for its proper combustion. It also means that he should be familiar with the melting temperatures of the metals being used, so that he may be enabled to adjust air volume and coke charges accordingly, or adjust the size of metal charge to accommodate air conditions and coke characteristics. The latter plan is preferable for the reason that, once the necessary air volume is found to be sufficient for a certain coke, the metal charges may be adjusted to accommodate the "burning time" of the coke.

The space occupied by a rational intermediate coke charge in any size cupola will approximate 6 to 6¼ in. in depth, and the time consumed in burning this quantity of standard cupola coke of good structure will be approximately 8 minutes. Therefore the metal charge should be adjusted by weight to conform with these conditions. Coke of the quality referred to, in the presence of adequate oxygen, will burn at the rate of approximately 2 lb. per minute per sq. ft. of cupola area—thus sq. ft. of cupola area multiplied by 2, and product multiplied by 8, will give a trial figure for the intermediate coke bed; and the intermediate coke bed figure multiplied by 10 will give a trial figure for the iron charge. Thus, a 90-in. cupola has an area of 44.18 sq. ft.—hence $44.18 \times 2 = 88.36$ lb. of coke burned per minute. Then

$88.36 \times 8 = 707$ lb., or 700 lb. coke charge, intermediate.
$707 \times 10 = 7070$ lb., or 7000 lb. iron charge.

Another important feature of the melting process is the care necessary to counteract excessive sulphur. While manganese may be relied on to keep sulphur within bounds in the metal mixture, yet limestone of proper quality and sufficient quantity should be relied on to flux excess sulphur encountered by contact of metal with coke. Under fairly representative working conditions (melting sand cast pig iron and unrattled scrap) there will be from 80 to 100 lb. of acid and basic matter to each ton of metal charged—including these constituents in the coke and limestone. By the use of machine cast pig iron, scrap wheels, steel and foundry scrap, there should not be more than 50 to 60 lb. to care for, exclusive of impurities in the limestone. Under the latter conditions there should be charged 50 lb. of limestone per ton of metal charged.

Pouring, Annealing and Cooling

The matter of thermochemistry vitally enters into melting, pouring, annealing and cooling processes. In relation to heat absorbed by iron in melting, it is well understood that car wheel or chilled roll iron may be heated so hot as to interfere materially with the needed physical characteristics of the metal. This danger largely lies in the tendency to oxidize the metal, which will not only interfere with the character of the chilled portions of the wheel but also the plate metal. If the average melting point of the metals composing the charges be 2100 to 2150 deg. Fahr., due care in melting should be exercised not to attempt a too high superheat—which practice may cause the metal to be oxidized, resulting in blowholes, coldshuts or seams and the dissemination of excessive free cementite in the gray portion of the metal by raising the combined carbon above 0.85 per cent.

It is also a generally recognized fact that there is a critical pouring temperature best suited for various lines of work, and this feature is a very important one in the manufacture of car wheels. Car wheel metal should be melted and superheated to about 2550 deg. Fahr., when tapped from the cupola; otherwise it may not be held sufficiently long before pouring for proper tests to insure uniformity of composition and chilling requisites. After transfer of metal to 1000-lb. ladles for pouring, it will cool at the rate of approximately 20 to 30 deg. Fahr. per minute. In the mixer it will not cool faster than 8 to 10 deg. per minute. If metal be poured at a temperature much below 2450 deg. it is likely to produce liquid contraction and cavities; if poured below 2350 deg. Fahr., blowholes will likely result by reason of trapped gases—both entrained air and oxide gases.

When the metal is tapped into the mixing ladle, all elements (metalloids) are in a state of solution with the iron. When poured, and solidification begins, certain separations and combinations occur throughout definite temperatures down to the last critical point (about 1235 deg. Fahr.). While the temperature is falling certain arrests occur; and, if sufficient time be given to create equilibrium, substances either separate out or combine to form eutectics, or eutectoid. In case of rapid cooling of the tread portion of the wheel, one separation or combination is not complete before another begins—hence rapid cooling suppresses these changes, and the result is an unstable mass of metal with a tendency to be hard and brittle.

If a temperature around 1832 deg. Fahr. be maintained for a long period of time, the iron-carbide of the metal decomposes and graphite is produced; therefore care has to be exercised in not maintaining this temperature—or even 1500 deg.—an unreasonable length of time, on account of possible decomposition of the iron-carbide in the tread portion, which will render it soft. The highest temperature at which no graphitization takes place in the tread is about 1292 deg. Fahr., and approximately this point should constitute the maximum annealing temperature.

If a wheel be pitted, say at 1800 deg., care must be taken to have the temperature of the pit, at pitting time, low enough to equalize the temperature around 1292 deg., after taking up the heat thrown off by the wheel at a fairly moderate rate. As expansions and contractions in both the white and the gray portions occur between 2075 deg. and 1235 deg. Fahr., removal of the wheels from the pit may be safely made at 1000 deg. In fact, below 1100 deg. the cooling may be permitted to be rapid, as there is no noticeable increase in hardness below that temperature.

Inasmuch as the cementite splits up into a mechanical mixture of ferrite and cementite to form "pearlite" at about 1300 deg. Fahr., it will be seen that the temperature of the wheels should be maintained for a long period around this critical point, to facilitate the formation of pearlitic structure in the plate portion—then should be cooled reasonably slowly from 1300 down to 1235 deg., for granular pearlite forms by rapid cooling, while laminated pearlite forms by slow cooling. As pearlite is the strongest and toughest constituent in cast iron, this mechanical mixture is desired in the plate portion of the wheel.

A Specialized Molding Machine Problem

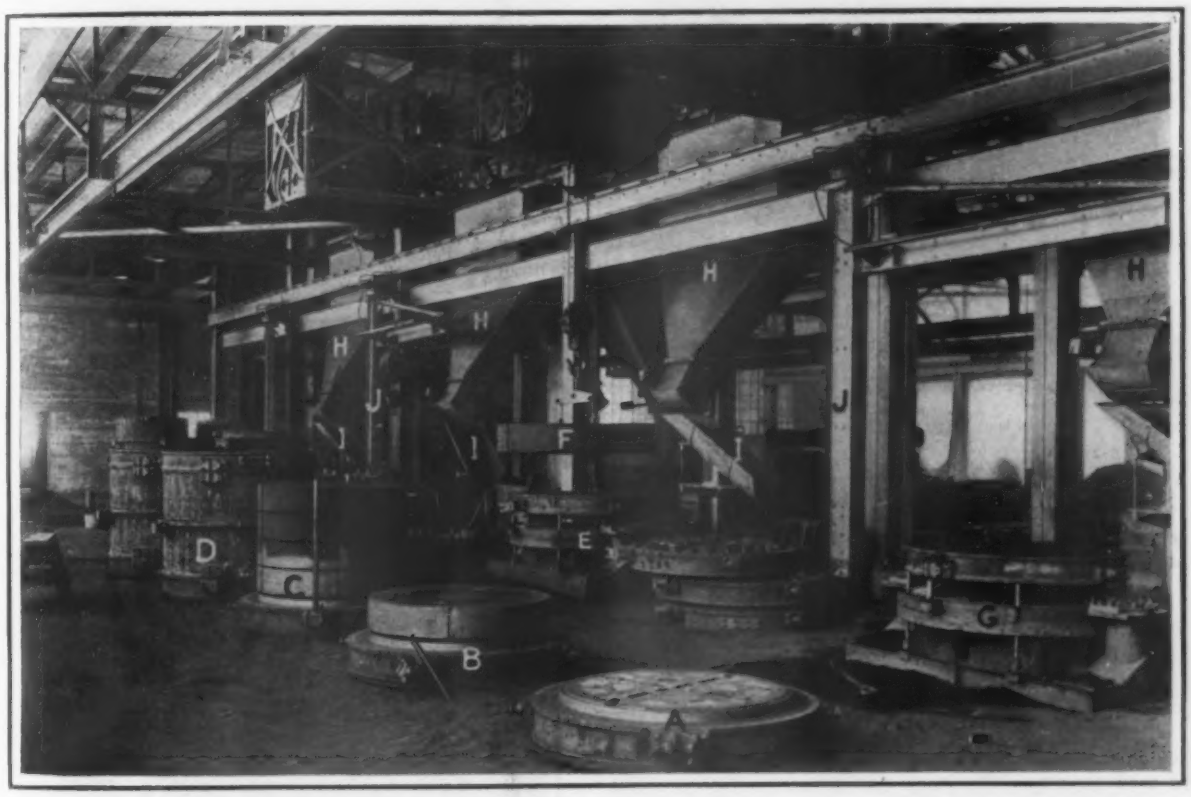
How Thin Cylinder Castings with Internal Ribs Are Made Successfully on Machines—Details of How the Work Is Done

LONG known as a leader in the use of molding machines for the production of textile castings, the Saco-Lowell shops, Newton Upper Falls, Mass., manufacturer of textile machinery, has done a good deal in the way of developing drop plate or stripping plate machines, and in devising methods for making three-part molds in a two-part flask, also the use of special gates and other clever molding machine devices. But there was one type of casting which the company had to make that all of the molding machine people showed a tendency to sidestep. The larger of these consisted of a cylinder nearly 4 ft. long, and of approximately the same diameter. These cylinders have five re-entrant ribs or flanges on the inside, and have to be finished all over the outside, and inside of the end flanges. When finished, the castings must be balanced to run without vibration and must be kept very thin, to give them a minimum weight.

When molded by the hand method, the flanges were attached to suitable strips and then a ring used for ramming up the outside, the drag not being rolled over but being formed in its permanent position, and the interior of the mold being partially filled by the introduction of some large blocks to reduce the amount of sand that had to be rammed. After the ring was drawn the cheek was lifted off and the internal flanges picked out. The mold was then finished, closed and the cope closed on. Naturally, the output per man per day was low.

When the H. M. Lane Co., Detroit, was called in to lay out a new foundry, Mr. Lane was asked to solve this problem. The engineers first made a general drawing of the castings to be turned out, and submitted it to the various molding machine people, most of whom felt that, on account of the series of internal ribs, it was not practical to turn out this casting on a molding machine. The engineers next designed a set of rigging, which involved some rather unique features in molding, and re-submitted the problem to the molding machine people. After carefully studying it, bids were obtained from a number of molding machine manufacturers.

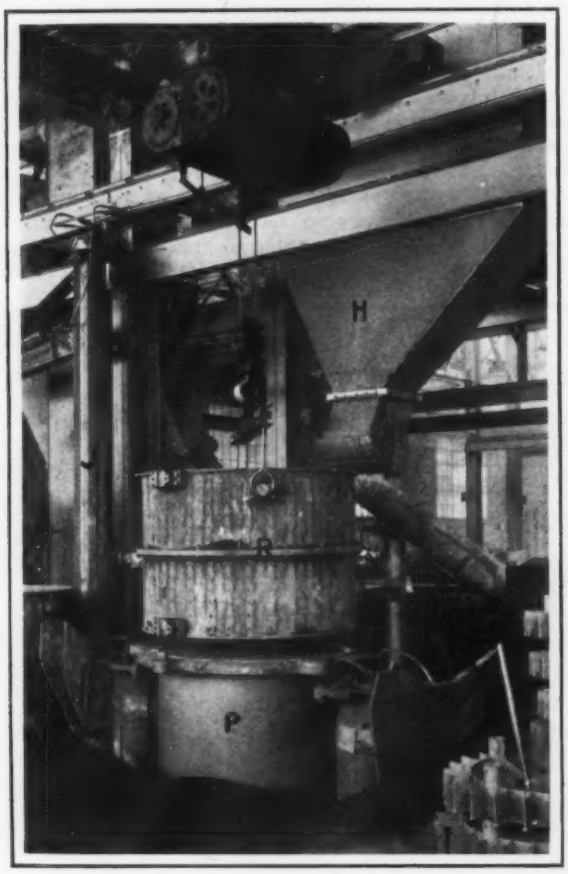
At this period, however, many of the companies were so full of work on account of the late war conditions that they were unable to promise suitable delivery, and as a consequence only a few firms put in actual bids. The Hermann Pneumatic Machine Co., Zelienople, Pa., was awarded the contract for eleven machines—four molding machines for making the large cylinder, four for making a small cylinder, and three to act as shakeout machines for shaking out molds. The R. W. McIlvaine Co., Chicago, was given a contract for the sand handling equipment to accompany these machines.



General View of Molding Floor, Showing at *A* the Drag Mold Made on Molding Machine *E*. At *B* is shown a drag with one core in place, and another core hanging from the crane at *F*. At *C* is a mold with all four green sand cores in place. At *D* a cheek is in place and the cope made on the machine *G* has been set. The molding sand hoppers are shown at *H* and the spouts at *I*

The general scheme of molding is quite well illustrated in the general view of molding floor, which shows a series of the larger molds in process. In the foreground at "A" can be seen the drag portion of the mold, which is made on the drag machine shown at "E." The mold is poured through a central gate by means of four runners at the bottom, which can be plainly seen in the illustration at "A." A drag is shown at "B," with the first unit core piled on top of it. These cores are simply blocks of green sand rammed up on crabs or core arbors, as will be described later. One of these cores about to be placed can be seen hanging on the crane at "F," and at "C" is a drag mold with the cores necessary to complete

the interior of a mold set in place. At "D" is shown a completed mold with the cheek lowered over the cores, the cope closed on and the runner box made up. At "G" is shown the cope machine with the cope mold stripped up, ready for lifting off and closing onto the next mold. At various places along the floor jib cranes "J" are located for handling flasks onto the molding machines, crabs onto the core machines, and for doing various little pick-up jobs to relieve the main traveling cranes, which are used for handling molds,



Cheek Molding Machine, Showing the Pattern at *P*, the Finished Cheek at R, the Sand Hopper at H and the Spout at *I*. In the position shown the pattern is in a raised or stripped position; as the pattern descends, the wooden doors at the sides close so as to fill the space about the molding machine

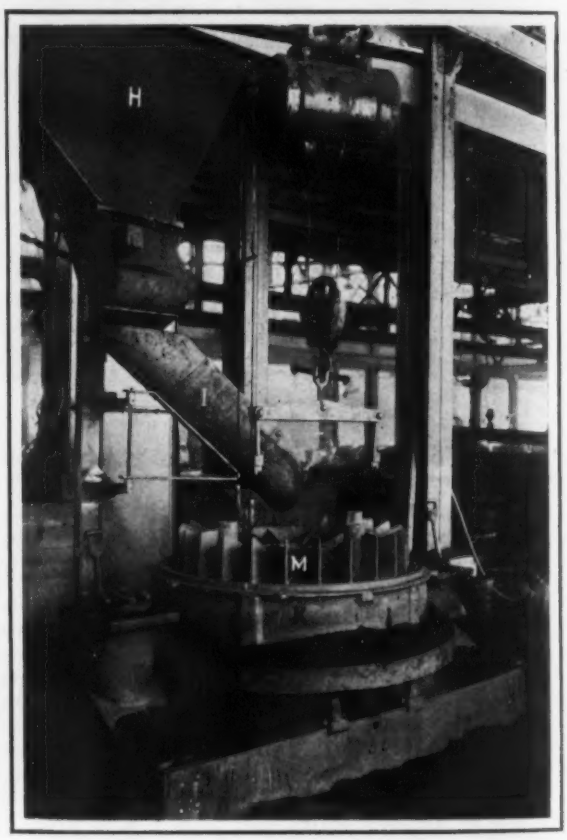
closing molds and shake-out. The sand bins containing the tempered molding sand are shown at "H" and the spouts for delivering the sand into the molds at "I."

In the detail view of the cheek machine, the cheek pattern in its stripped or drawn position is shown at "P," and a cheek mold "R" is being lifted off. The sand bin "H" is shown, the swinging sand spout "I," and the swinging jib crane "J," for handling flasks. At the right and left of the molding machine can be seen two pieces of floor, which the machine plows out of the way as it strips the mold up. When the pattern plate with the flask on it is in the lowered position, these pieces close the space around the machines and make it easy for the men to manipulate the swinging spout, fill the flask, and look after the bumping.

In another view, the specially arranged core machine is shown, with one of the core arbors or crabs in place, but with the core box stripped down, or rather the core plate with the crab pushed up from the core box. The next operations would be to lower the core plate and crab into the core box, to introduce sand from the sand bin through the swinging spout, to jar the sand in the box, and then strip the core up and out of the box. The core arbor or crab is shown at "M" and the box at "K." After the core is made it is picked up by a special pair of tongs and porter bar, as shown at "F" in the first illustration. The reamed holes in the core arbors or crabs are utilized for lining up the cores by means of pins, one of which can be seen leaning against the drag flask "B."

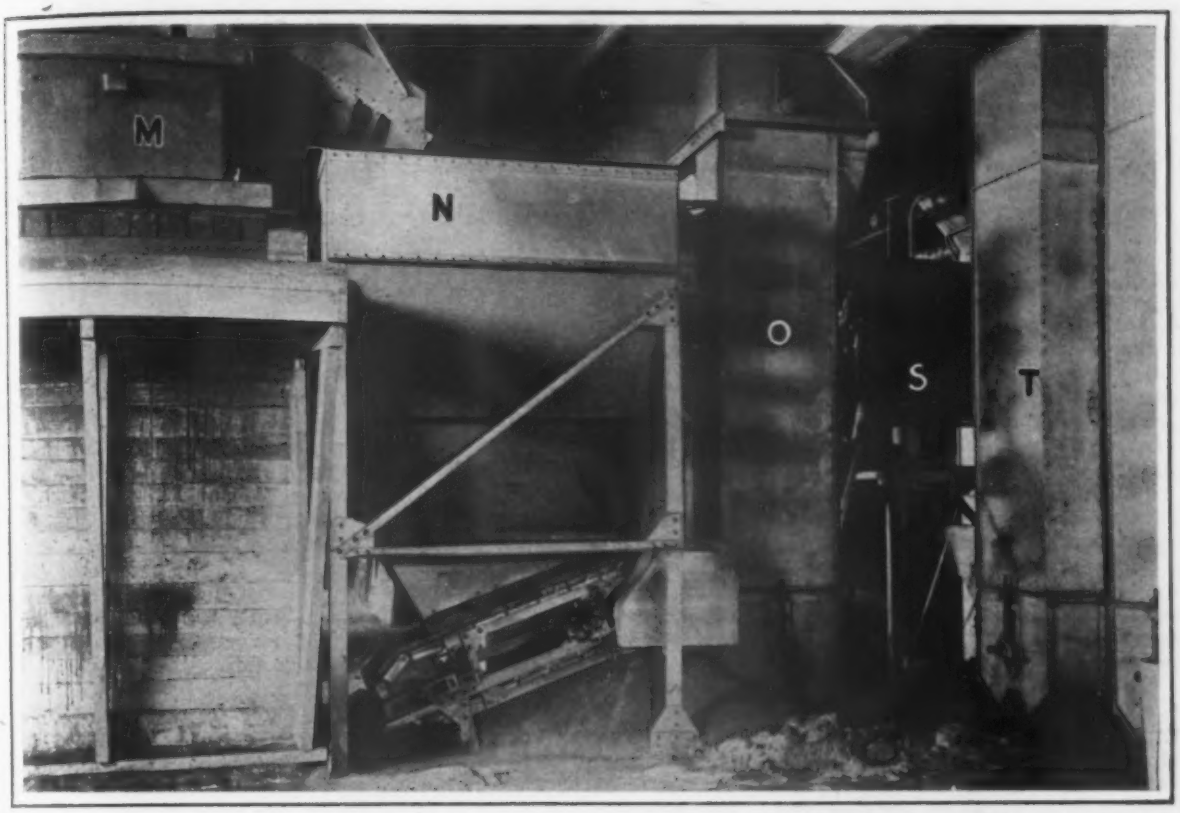
After the molds are poured, they are shaken out by means of a shakeout machine, and the sand passes down through the floor, that from one of these machines landing on a long conveyor belt. This conveyor belt crosses the front side of the foundations of the machines used for making molds for the large cylinder, and terminates in the bin "N." The second knock-out machine, "M," is the bumping machine on which the knock-out grating is supported, and the sand from the molds passes through the inclined spout into the bin "N." By this means all of the sand from the large cylinders is brought into the one bin for tempering and return. Beneath the bin there is a pan conveyor which discharges into elevator "O," and this in turn delivers the sand to a Standard Sand & Machine Co. mixing machine "S" from which it is discharged into the bucket elevator "T." This bucket elevator takes it to a conveyor from which it can be plowed off into the various bins over the molding machines.

Equipment of this kind can be used only in the case of a highly specialized product, but the saving is so great that in many cases it is possible to put in such equipment for a comparatively small number of castings per day. The man-hour cost of castings since this equipment has been put in has been reduced considerably below that in the old shop. This does not necessarily mean such an exceedingly great reduction in the final cost of castings, because we must recognize the fact that we must pay depreciation, and upkeep, on an extensive battery of machines and its attendant sand handling appliances, but the greatest thing to be considered is the fact that these castings



Green Sand Core Machine—a Special Jar Stripping Machine with a Core Box Shown at *K*, and a Core Crab or Arbor on the Plate at *M*

have been removed from hand work and the necessity of skilled molders, and placed on the basis of machine molded castings. This type of casting, that is machine molded, is more sure to come true to pattern and be of lighter weight, and the scrap loss in the castings of this size is generally reduced. What has been accomplished, to a certain extent, is to put the brains into the machine, so that handy men or common labor



Sand Tempering Machinery for Cylinder Work. The conveyor belt shown below delivers sand into the opposite side of the bin *N;* the shake-out machine *M* also delivers sand to this bin. The sand is then fed to the elevator *O*, through the tempering machine *S*, to the elevator *T*, which delivers it by means of an overhead belt to the various molding machines

can perform the work which formerly took skilled men.

One interesting feature in connection with this is that, when any given plant decides to shift from hand molding to machine molding, it is almost always necessary to make a radical change in the type of sand used. The engineers have had experience in shifting over quite a good many problems from all hand work to machine work, or from partial hand work to machine work, and in almost every case it has been necessary to change the grade of sand used to get the best results out of the equipment, and in some cases this change means a larger consumption of sand per ton of finished castings, but that is more than compensated for in the improved quality and quantity of castings.

There are certain other devices which will be worked out later on this job, which it is believed will increase its output greatly, though at present the output per unit is more than ample to take care of present trade demands.

Seaman Gold Medal to Be Awarded

The Safety Institute of America announces that the Louis Livingston Seaman gold medal is to be awarded this year for progress and achievement in the promotion of hygiene and in the mitigation of occupational disease. This medal was first given in 1911, but for the last three years war conditions have prevented the institute from making the award. Former Surgeon-General Gorgas received the Seaman Medal in 1914 in recognition of his winning fight against the disease-carrying mosquito in Panama. The most recent award was to Arthur H. Young, Chief Sanitary Expert for the Federal Government during the World War.

In submitting to the board of trustees of the Safety Institute the letter from Dr. Seaman, re-establishing his medal, Director L. V. Coleman of the institute, said: "This generous offer comes at a time when through the instrumentality of Dr. C.-E. A. Winslow, our new health supervisor, we are in a position to make unprecedented progress in the field of industrial hygiene to which the medal is dedicated. Dr. Winslow is a conspicuous figure internationally in health and sanitation and has just completed his work as director of Red Cross societies in Europe. In view of this combination of circumstances I feel that we should give great encouragement to the furtherance of health work."

First Floor View of Cylinder Molding Equipment. The concrete foundations for the four molding machines for the cylinders are shown at the left. In front of them the conveyor belt takes sand from one of the knock-out machines to the sand tempering machinery

Patent litigation covering the alternating current arc welding transformer has been settled in favor of the Holslag claims, according to the Electric Arc Cutting & Welding Co., 152 Jelliff Avenue, Newark, N. J.

New Continuous Ten-Stand Strip Mill

Compact Unit Designed for Heavy Production— Interesting Details of Electric Drive Arrangement at Trumbull Steel Co.

A NEW 14-in. unit designed to roll intermediate sizes of bands, hoops and strips, varying from 2½ in. x 0.045 in. to 7 in. x 0.060 in., and thicker up to ¼ in., is being completed for the Trumbull Steel Co., Warren, Ohio. The finished product may be either coiled or cut to length. This mill is an electrically driven, continuous mill with a continuous furnace, heated by producer gas. Its capacity will vary from 140 to 600 tons per day, depending on the size of material rolled, and will fit in with the other mills of the strip department, which consist of a 16-in. continuous mill, a 9-in. continuous mill, and a cold rolling department having 35 stands of rolls arranged singly and in trains varying from two to four stands. The new mill was constructed by the Morgan Construction Co., Worcester, Mass., and is being erected by the steel company.

This unit is housed in a new steel building 1200 ft. long and 100 ft. wide, consisting of 60 bays 20 x 100 ft. The roof is 1 to 5 pitch double monitor type, with continuous sliding wood sash on the lower part and continuous louvers on the upper part. The roof truss elevation is 33 ft. above the floor line. This building, which forms a continuation of the 16-in. mill building parallel to the 9-in. mill building and the pickling building, is easily accessible to the cold rolling department.

The building is served by two 15-ton cranes mounted on 60-lb. crane rails. The six bays at the north end will be used for a billet yard and will permit three 30 x 60 ft. billet storage piles; 24 bays in the middle of the building will be devoted to the rolling mill with its furnace, motor room, conveyors, etc., and the south half of the building will be used for the handling, storage and shipping of finished products.

The billet yard will have a 30-ton scale at the floor level, having 24-ft. platform and cradles for weighing billets and, also, five cast iron billet skids (6 ft. 8 in. centers) which feed billets to charging conveyors. The first skid is 143 ft. 5 in. south of the north end of the building.

Heating Furnace

Morgan recuperative type of continuous heating furnace is installed, using producer gas as fuel. Gas is made in a plant west of the 9-in. mill, this plant serving both the 9-in. mill and the new 14-in. mill furnaces. There are two Morgan and two Hughes gas producers. The heating furnace for the 14-in. mill has a Slick suspended roof, eleven cast iron water-cooled skids, and magnesite brick on bottom of 4 ft. 6 in. inclined hearth and all of horizontal hearth. The Sturtevant air exhaust is driven by 17½-hp. motor. From furnace center line to north end of building is 210 ft. The furnace brick work is 34 ft. 2 in. wide and 37 ft. 2 in. long. The 32-ft. width of hearth has water-cooled skids 4 in. wide and 7 ft. 7 in. long, spaced 2 ft. 7½ in. center to center. The brick hearth is 27 ft. 9½ in. long, with 24 steel skids 2½ in. x 9 in. x 15 ft. long spaced 13½ in. center to center. The length of inclined hearth, measured horizontally, is 22 ft. 5½ in., the slope of hearth being 1:5.

The furnace has an external charging conveyor with over-all length of 36 ft. 3½ in., supported by six cast iron stands having seven hollow cast iron rollers 15 in. in diameter and 18 in. long, which have a peripheral speed of 460 ft. per min. An internal charging conveyor, consisting of five water-cooled rollers, lies inside the heating furnace, with roll shafts inclined at an angle of 87 deg. with furnace and line of billet travel. The rollers of both conveyors are driven by one 12-hp., d.c. motor, the internal rollers being driven from the outside of the furnace by a line shaft and helical gears. The internal rollers, having a peripheral speed of 96 ft. per min., are 8 in. in diameter and 14 in. long, the end 3½ in. of rollers tapering down to 6 in. in diameter.

Morgan type of cross pusher is used, having five steel pusher arms, operated by cranks on line shaft

As the Steel Passes Through This Continuous Mill, from the Billet Coming Out of the Heating Furnace at Left to the Strip Emerging from the Last Stand of Rolls at Right, It Undergoes a Varying Reduction in Sectional Area, Averaging About 40 Per Cent in Each of the Four Passes of the Roughing Mill, Somewhat Less in the Two Intermediate Mill Passes and a Much Smaller Amount in the Four Finishing Mill Passes—the Last Pass Furnishing Under 9 Per Cent. Its speed of advance, with the operating motors running at their several maximum speeds, increases successively from about 110 ft. per min. leaving the first stand to some 2000 ft. per min. from the tenth stand. These speeds, however, being directly under control of the roller, may be adjusted at any figures between those given and one-half those values. The roll speeds, at maximum motor speeds, vary from 33 r.p.m. in the first set to 550 r.p.m. in the tenth

which is actuated by a bell crank connected to the piston of a steam cylinder, with the entire cross pusher bolted to furnace buck stays. The pusher arms are 1¾ in. x 5½ in. x 3 ft. 7 in., crank shaft 27 ft. 4½ in. long x 6⅛ in. diameter, steam cylinder 25 in. diameter x 31⅛ in. long. Push-out rolls are of Hawthorne type, with overhung pinch rolls 11⅞ in. diameter x 10 in. long, with a peripheral speed of 330 ft. per min., driven through gear reduction by 12-hp., d.c. motor. Pull-out rolls with rolls, roll drive and top roll lifting mechanism, are bolted to the furnace steel work; the bottom roll, which is 10 in. in diameter x 29½ in. long, is driven through spur gear reduction by 5-hp., d.c. motor, at a peripheral speed of 89 ft. per min. The top roll lifting mechanism is operated through a worm reduction by a 2-hp., d.c. motor. The top roll is 10 in. in diameter and 2 ft. 8 in. long.

Roughing Mill Roll Train

Consisting of four stands of horizontal rolls with an emergency shear, three vertical edging mills and a flying shear, the roughing mill roll train is arranged as follows: emergency shear, 16-in. edging mill, two stands of rolls, 12-in. edging mill, two stands of rolls, 12-in. edging mill and flying shear.

Two-high, with open top housings, the roll stands have top roll adjusting screw 4¼ in. in diameter by 3 ft. 3½ in. long over all, 4 threads per inch. The bottom roll bearing is adjusted by wedges operated by screws on the side of the housings. The rolls are of cast steel varying in diameter from 13.86 in. in the fourth stand to 12.54 in. in the first stand; length of body is 16 in., necks 10 in. in diameter x 13 in. long; wabblers are 9 in. in diameter x 5½ in. long.

The emergency shear is the Edwards up-and-down type, which cuts at a rate from 7 to 29 strokes per minute; the knives are 18 in. wide, the upper one traveling 5 in. and the lower one 3 in. This shear and the 16-in. edging mill are operated through a gear drive by a 140-hp. General Electric motor. The flying shear is an Edwards steam-operated type; the width of the knives is 10 in. and the diameter of the steam cylinder is 12 in.

From the center line of roughing mill train to west building columns is 36 ft. 6 in.; from face of furnace brick work to center line of emergency shear is 5 ft. 6 in.; from floor line to center line of emergency shear, 2 ft. 7 in. From the face of furnace brick work to 16-in. edging mill is 8 ft. 10½ in.; from center line of edging mill to center line of first roll stand, 4 ft. 7½ in.; from here to center line of second roll stand, 6 ft.; thence to 12-in. edging mill, 4 ft. 5¼ in.; and to third roll stand, 8 ft. 9¾ in., and third to fourth, 9 ft. Thus, from the center line of emergency shear to center line of fourth roll stand is 36 ft. 3 in.

Intermediate Mill Roll Train

This train consists of two stands of rolls, the fifth and sixth, with the same roll housings as the roughing mill. The rolls are cast iron clear chilled to 13 in. in diameter, and vary in diameter from 13.6 in. to 13.2 in.; all the other roll dimensions are the same as those of the roughing mill. From the center line of the fourth stand in the roughing train to the center line of the fifth stand in the intermediate train is 27 ft. 6 in.; from the fifth stand to the sixth stand center line is 9 ft.

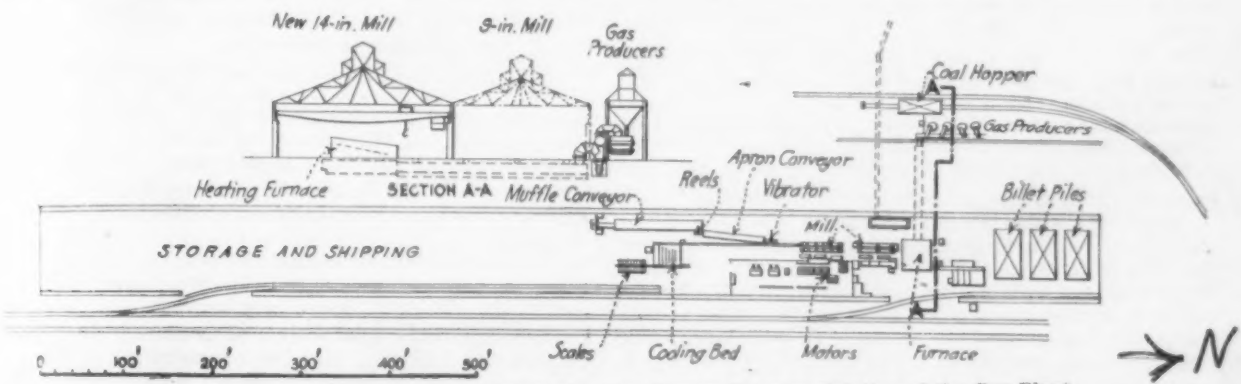
Finishing Mill Roll Train

While the roll housings of this train are the same as those of the roughing and intermediate roll mills, the rolls vary in diameter from 14.4 in. to 13.6 in. They are cast iron clear chilled to 13 in. in diameter. The roll stands are spaced on their center lines as follows: From the sixth to the seventh, 9 ft.; from the seventh to the eighth, 9 ft.; from the eight to the ninth, 8 ft. 3 in.; from the ninth to the tenth, 7 ft. 6 in. The roll diameters in this train are so graduated that, when ground too small for one stand, a roll may be used in the next stand back.

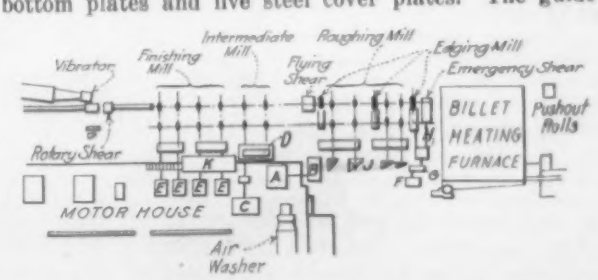
Equipment for Handling Finished Material

Beyond the finishing roll train are guide troughs for sending material to either the rotary shear or the vibrator, depending upon whether the strip is to be shipped in lengths or in coils. The guide trough to the rotary shear is straight and has an over-all length of 16 ft. 6½ in.; two widths are provided, 6 in. and 9 in., consisting of two 8-in. side channels, ten cast-iron bottom plates and five steel cover plates. The guide trough to the vibrator first twists the material to the vertical and then turns on a 10-ft. radius to an angle of 14 deg. 18 min. and delivers material to pinch rolls at the vibrator.

Beyond the finishing mill train is a rotary shear designed to cut strip into 12-ft. to 30-ft. lengths; this shear, which is placed 22 ft. from the center line of the tenth roll, has two knives 8 in. wide on each rotating shaft and is driven by a 4-in. double belt. Between the final belt and the line shaft are two belts running on four conical pulleys. The line shaft, which is used in common by the rotary shear and the vibrator, is driven by a 5-in. double belt running on a pulley on the tenth roll stand lead spindle. From the rotary shear a Morgan skelp conveyor carries the cut lengths



General Layout of the New Strip Mill Building, with Section Showing Relation of the Gas Plant



Layout of the Main Elements of the New Continuous Strip Mill, Showing Powering

A—1250-hp. motor operating roughing mill of four stands through speed-reduction gears *B* (142 to 43) and bevel gears *J*.

C—1250-hp. motor operating intermediate mill of two stands; motor direct connected to stand No. 6 and, through reduction gears *D* (61 to 45), to stand No. 5.

E—Four 800-hp. motors direct connected to the four stands of the finishing mill.

F—90 to 140-hp. motor driving 16-in. edging mill and emergency shear through speed reduction gears *G* (245 to 36) and *H*.

K—Operating pulpit for mills. The two sets of 12-in. edging rolls are driven by gearing from the spindles of second and fourth roughing stands, respectively.

to the cooling bed, which consists of 43 cast-iron rollers 10 in. in diameter, 8 in. long, and 30 in. centers. The rollers are fastened to 1 3/16-in. diameter shafts by two set screws; the peripheral speeds of the rollers vary from 170 to 510 ft. per min. This conveyor is belt driven through one gear reduction by a 10-hp. motor. The conveyor terminates in two piling rolls 10 in. in diameter and 8 in. long, with a peripheral speed varying from 246 to 738 ft. per min. The piling rolls are driven by a 5½-hp. motor.

The cooling bed is a Morgan skelp type with reciprocating dogs, and is 116 ft. 2 in. from the center line of the rotary shear. Its width from the center line of the skelp conveyor to the center line of the pile conveyor is 28 ft. 5 in.; the length is 30 ft. 6 in. There are eight lines of dogs spaced 16 in. apart, with a stroke of 18½ in.; the stroke of the skelp conveyor kick-off is 22⅛ in. The dogs and kick-off are operated through clutches from the same gear reduction driven by a 20-hp. motor. Piles of cut lengths are tied before leaving the cooling bed.

To convey the tied pile to twin scales, the pile conveyor consists of 13 cylindrical rollers 15 in. in diameter x 12 in. long, and 11 double conical rollers 13 in long with 15-in. center diameter and 10¾-in. end diameters. The latter are arranged to dump on either side on the twin scales; their peripheral speed is 66 ft. per min. They are belt driven from a drop pulley driven through worm reduction by a 10-hp. d.c. motor. From the center line of the cooling bed to the center line of the 30-ton scales is 31 ft. 9 in. The scales have platforms 30 ft. long and there are 11 cast-iron storage bins for each side.

From the guide troughs material which is to be shipped in coils goes to the vibrator, which distributes the strip in a serpentine form upon an apron conveyor. Strip is driven through the vibrator by two pinch rolls 14 in. in diameter x 5½ in. long, having a peripheral speed varying from 1130 to 2260 ft. per min. The vibrator itself may have from 110 to 220 vibrations per minute, with variable lengths of vibrations; it is driven by an eccentric, which in turn is driven by a belt from the same line shaft as the rotary shear. The vibrator is 30 ft. 3½ in. beyond the center line of the tenth roll, and 3 ft. 10 in. west of the center line of the mill.

Taking the strip in a serpentine form from the vibrator to the reels, the apron conveyor acts as a cooling bed; it is driven through a reduction gear by a 10-hp. d.c. motor. From the vibrator to the foot shaft of the conveyor is 10 ft. 3 in.; foot shaft to head shaft, 70 ft. 1½ in. For coiling the strip, two reels at the head shaft of the apron conveyor have collapsible cores, 20½ in. in diameter, raised and lowered by link crank rod and eccentric driven by individual 15-hp. d.c. motor. The reels themselves are driven by individual 15-hp. d.c. motors, with speed varying from 72 to 288 r.p.m., and are equipped with a pull-over device for transferring coils to the muffle conveyor. This pull-over consists of a 1¼-in. square bar 14 in. long, suspended by I-beam monorail and having a dog on one end to hook coils. The bar is driven forward and back by motor-operated pinch rolls with speed of 30 r.p.m.; the pinch rolls, 9½ in. diameter, are driven through worm reduction by 12-hp. d.c. motor. From center line of vibrator to center line of reels is 88 ft. 9 5/16 in.

Two muffle conveyors of the chain and dog type, located side by side, receive coils from reels and convey them through a partially deoxidized atmosphere and deliver them to trucks; the muffle effect is secured by water-cooled cover plates. At the end of the main conveyor, short inclined chain conveyors lower the coils onto trucks; each conveyor is driven through gear reduction by a 12-hp. d.c. motor. The length of this conveyor, from center line of reels to center line of head shaft, is 116 ft. 4 3/16 in. The speed of chain is 350 ft. per min.

Motor Room and Electric Equipment

The motor room is located on the east side of the mill building, 280 ft. from the north end columns, with a length of 140 ft. and a width of 43 ft. 9¾ in. The walls are brick and the roof of corrugated sheeting, removable to admit crane hooks into motor room. All mill driving motors, two motor-generator sets, exciter, and a Sprayco air washer are in this room.

All electric equipment was furnished by the General Electric Co. The four roughing stands are driven by a 1250-hp., 175 to 350 r.p.m., d.c. motor, and the two intermediate stands by another, which is connected directly to the sixth stand and, through a train of gears, to the fifth stand. The last four stands, which constitute the finishing mill, are individually driven by 800-hp. d.c. motors, directly connected to the top pinions, with speed varying from 200 to 550 r.p.m. These six motors obtain their power at 600 volts, direct current, from two 2300-kw. compound wound motor-generator sets, type MCF 12-450 r.p.m, 600 volts, each driven by a 2300-kva., 450 r.p.m., 220-volt motor.

Industrial Advertisers in National Conference

An opportunity for discussing industrial advertising will be offered at the convention of the Associated Advertising Clubs of the World in Milwaukee, June 11 to 15. At this convention will be held the First National Industrial Advertising Conference, of which Keith J. Evans, advertising manager Joseph T. Ryerson & Son, Chicago, is chairman.

Among the talks slated for the first session, Monday afternoon, June 12, are:—"Advertising as a Factor in Inter-Industrial Marketing" by W. W. Coleman, president Bucyrus Co., Milwaukee; "What the U. S. Department of Commerce Is Doing to Aid Inter-Industrial Marketing" by F. M. Feiker, former assistant to Secretary of Commerce Herbert Hoover. Mr. Feiker intends to take up the new purposes of the department in relation to inter-industrial marketing and, in addition, will bring a personal message from Mr. Hoover to the conference. Another paper will be on "Advertising in Its Relation to the Four Points of Contact in Industry" by Bennett Chapple, director of publicity American Rolling Mill Co., Middletown, Ohio. He will outline the methods of investigating industrial markets, will show how the size and importance of actual and potential outlets for industrial products may be determined, how industrial advertising should carry in to stockholders, employees, customers and the public at large. He will also touch upon the cumulative advertising which he has secured for "Armco."

On June 13, J. C. McQuiston, manager department of publicity, Westinghouse Electric & Mfg. Co., Pittsburgh, will speak on "Selling to the Professional Man in Industry." Morris W. Lee, vice-president Frank D. Chase, Inc., engineers, will talk on putting ideas into industrial advertising.

There will be open to the public an exhibit of the industrial advertising put out during the year. Ezra Clark, Clark Equipment Co., has promised to send his twelve highly regarded paintings on "The Spirit of Transportation" by America's leading artists. The Standard Oil Co., Universal Portland Cement Co., General Electric Co., Western Electric Co., Link-Belt Co., Hyatt Roller Bearing Co., American Locomotive Crane Co., Allis-Chalmers Mfg. Co., the Ryerson company and other industrial establishments are expected to send in exhibits. Several of these will be complete advertising campaigns including general advertising, business paper ads, letters, broadsides, folders and catalogs.

April sales of members of the National Association of Sheet and Tin Plate Manufacturers, as reported to and compiled by the association, were 264,629 tons or 107.7 per cent of capacity. Production for the month was 184,979 tons or 75.2 per cent of capacity; shipments aggregated 177,855 tons, or 72.3 per cent of capacity; unfilled tonnage as of May 1, 395,620 tons or 161 per cent of capacity; finished stock on hand awaiting shipment, 67,297 tons, or 27.5 per cent of capacity; in stock, unsold, 34,166 tons of 13.9 per cent of capacity. The total number of hot mills in the United States is 641, having a capacity for April, 1922, of approximately 365,000 net tons and the percentage of the capacity to which the figures given are related is 67 per cent.

One of the Six 72-In. Shaft Caps of Manganese Bronze for the Catskill Aqueduct. The weight of this casting is 12 tons

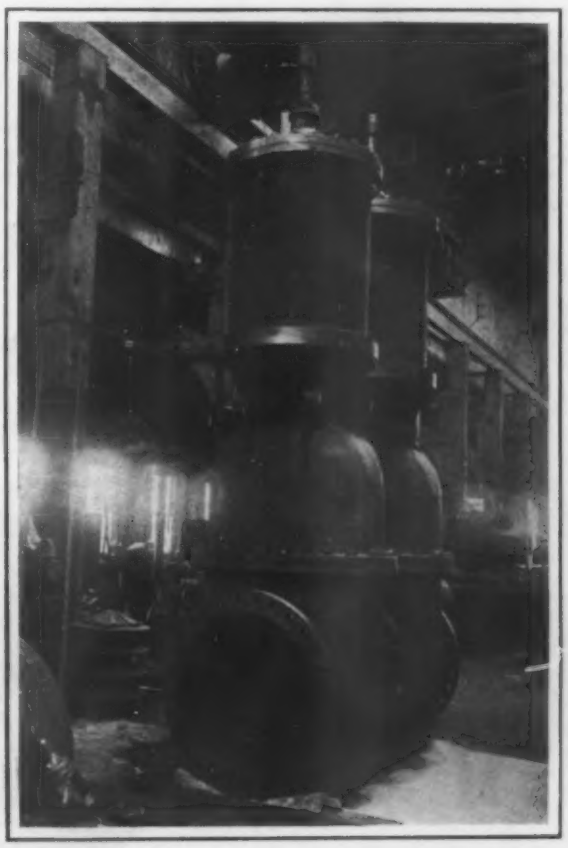
Manganese Bronze in Engineering Work

How It Is Made in a Large Foundry—Its Properties in Castings and Rolled Form—Typical Installations

THE manufacture of manganese bronze presents a striking example of the deoxidizing and beneficiating effect of manganese on molten metal. While this effect of manganese is true to a certain extent in steel, it is much more intensified in manganese bronze. A large percentage of the original manganese remains in the steel, but it nearly all disappears in the course of its action on bronze.

There is also a strong analogy between the foundry practice for steel and manganese bronze castings. A visit to a manganese bronze foundry recalls distinctly conditions obtaining in a steel foundry making similar types of castings. Molding operations are similar as to sand, gating and the provision of sink heads. Thorough drying of the molds is necessary in many cases, although some green sand work is practiced. The method of pouring the metal is strikingly similar, as well as the apparatus used in cleaning and preparing the castings for shipment.

These reflections are the result of a visit recently to what is considered the largest manganese bronze plant in the United States operated by private initiative, that of the American Manganese Bronze Co., Holmesburg, Philadelphia. The size of this plant is the result of the gradually increasing importance of manganese bronze as an engineering material. Aside from the incorporation of this alloy in propeller wheels, one of its most extensive applications, it has been and is being used in several large engineering undertakings, some of which are discussed and illustrated further on in this article.



One of the Large Manganese Bronze Valve Castings, Situated at a Great Depth in the Ground in the Catskill Aqueduct

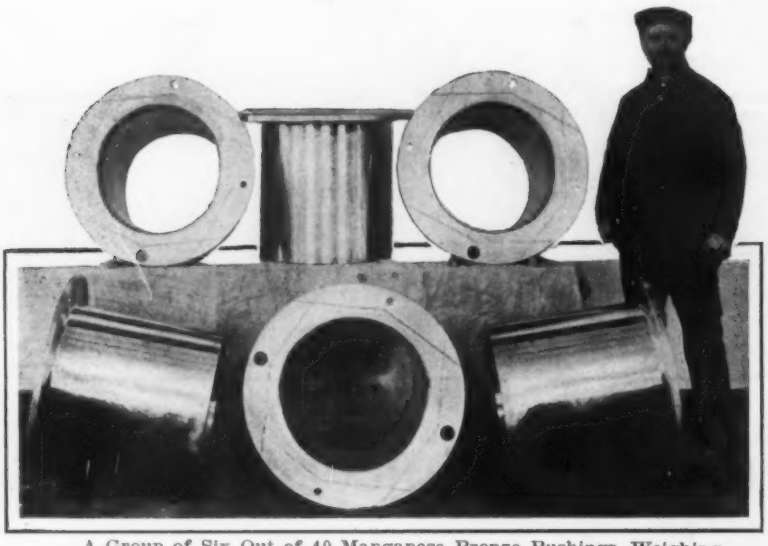
The United States Navy specifications for manganese bronze afford the best conception of the average composition: Copper is specified at 55 to 60 per cent; zinc at 38 to 42 per cent; tin at zero to 1.50 per cent; manganese at zero to 3.50 per cent; aluminum under 1.50 per cent; iron under 2 per cent, and lead under 0.20 per cent. It frequently happens that the final product, after the introduction of manganese, contains very little except copper, zinc and tin.

The same specifications call for a tensile strength of not less than 70,000 lb. per sq. in. and an elongation of 20 per cent in 2 in. It will thus be seen that cast manganese bronze has physical properties closely approximating the average run of fairly high carbon steel castings.

The feature of the plant of the American Manganese Bronze Co. is its melting equipment. For castings requiring large quantities of metal a 15-ton reverberatory furnace is used. There is also a 27-pot crucible department where fairly large or small quantities of the regular and special alloys and bronzes of the company are produced. A recent installation has been two 1-ton Detroit electric rocking furnaces which have been used to special advantage on manganese bronze with particular reference to the materials charged and the loss in melting. Besides these there is also a ½-ton Schwartz furnace for special work under special conditions.

The company's entire melting equipment, comprising the four different types, represents a capacity of 100,000 lb. per day of 12 hr. For handling the molten metal as well as for other work, the foundry is equipped with two 15-ton electric cranes and several smaller ones.

Of course only virgin metals are used, no matter which melting process is employed. In all cases the manganese is introduced as ferromanganese. In the manipulation of copper or its alloys in the molten condition there is a strong tendency for the copper to oxidize, resulting in the presence of copper oxide. This impurity or oxide weakens the alloy produced when manganese is not present. The use of manganese



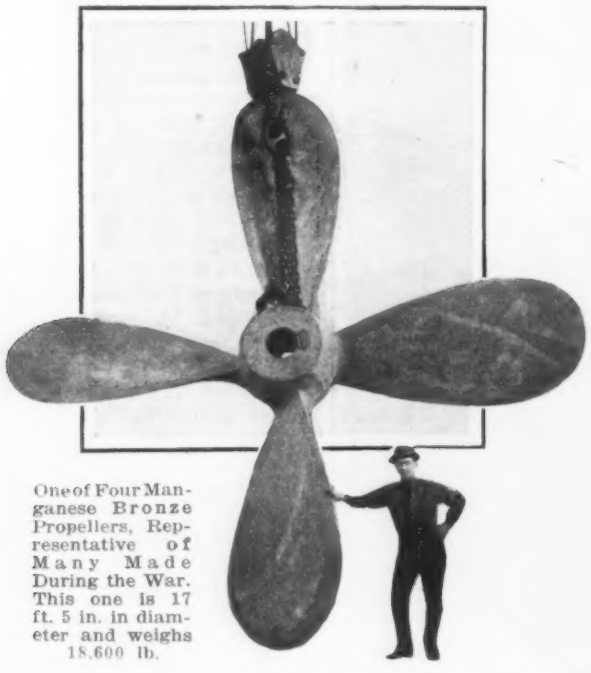
A Group of Six Out of 40 Manganese Bronze Bushings, Weighing 500 Lb. Each

Screw Down Nut Hy-Ten-Sl Bronze for a Horizontal Plate Bending Roll in a Steel Rolling Mill

changes the character of the alloy, removing the oxides and otherwise benefiting the metal. The physical properties of ordinary bronze are quite inferior to the same composition in which manganese has performed its role.

Besides the physical properties of regular manganese bronze castings as produced, ranging from 70,000 to 80,000 lb. per sq. in with a ductility of 20 to 30 per cent in 2 in. as elongation and reduction of area, the metal shows a uniform, even grain and is tough. This alloy is non-corrosive in sea water and acid mine waters. It is claimed it does not crystallize under vibratory stresses, and when forged or rolled its yield point is increased and its structure rendered fibrous.

Since the establishing of this company in 1908 there have been several large engineering undertakings which have called for manganese bronze castings. It is in this field that the alloy has gained its widest use and greatest distinction.



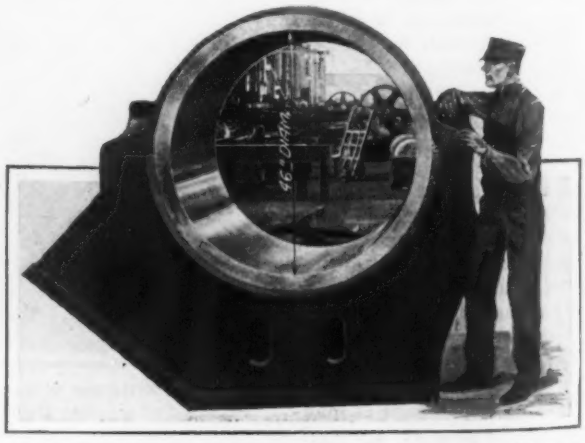
One of Four Manganese Bronze Propellers, Representative of Many Made During the War. This one is 17 ft. 5 in. in diameter and weighs 18,600 lb.

The earliest example of this was the production of hydraulic castings for the Panama Canal. In that undertaking many castings of manganese and special bronzes were installed because of the corrosive conditions prevailing, due to sea water and a partly torrid climate. Over 200 tons of this alloy have been incorporated in the various lock operating mechanisms.

But the most striking engineering application of this alloy is probably that in the Catskill Aqueduct. To meet the unusual conditions prevailing in certain parts of this great work a metal for valve and other parts was required which combined strength with non-corrodibility as well as resistance to seepage; and these characteristics were stressed because many of the castings are located at a great depth.

Some of the illustrations reveal the size of these castings and the foundry problems involved in their production. More than 600 tons of this alloy, either as castings or forgings, was used in various parts of the aqueduct. Six of them alone required 34,000 lb. of metal each for pouring and weighed 12 tons each when machined. They had to withstand a test pressure of 200 lb. per sq. in.

As a war material manganese bronze played an important role, largely in propeller wheels. Over 1000 such wheels of various sizes up to 20 ft. in diameter and 22,000 lb. in weight have been made, most of them for vessels built during the war. Certain illustrations reveal the character of these wheels whether solid or built-up ones.



Counterweight Trunnion Bearing of Manganese Bronze Used on the St. Charles Air Line, Bascule Bridge, Illinois Central Railroad

Mention should here be made of a special bronze—a modification of manganese bronze—called Hy-Ten-Sl, which in castings has a tensile strength of 90,000 to 120,000 lb. per sq. in., yield point 50,000 to 70,000 lb. per sq. in., and an elongation and reduction of area of

20 to 12 per cent. It is described as the strongest of all bronzes and as about equal to nickel steel. In its rolled or forged conditions its tensile strength ranges between 110,000 and 125,000 lb. per sq. in., with a yield point of 70,000 lb. per sq. in. Details as to its composition and production are not available.

By no means insignificant is the use of this special alloy in bridge construction as trunnion bearings, the Hell Gate and Quebec bridges being instances of such use. These are designed to meet conditions where a high elastic limit in compression is required. Another large use for this metal is large nuts in steel rolling mills, in worm wheels, and in parts of machinery carrying heavy, slow-moving loads.

The developments here outlined in the manufacture and use of manganese and similar bronzes are strong testimony to the rôle which non-ferrous metals of all kinds, particularly as alloys, are assuming. Manganese bronze as castings is not heat treated. As forgings or rolled products the alloy exhibits distinctive properties. It is not improbable that progress in this field of metallurgy and heat treatment will be such that new properties will be developed, even in castings, which are not now known.

Hours of Labor in the Iron and Steel Industry

Notable Reduction in Periods of Duty in the Decade Ended in 1920 in Iron and Steel Making and in Rolling Mills

THE latest report of the U. S. Department of Labor, through its bureau of labor statistics, on conditions in the iron and steel industry, now in the hands of the printer, shows that a considerable change was made in the hours of labor of employees between 1910 and October, 1920, the date of the last figures in the report. The report is based on data obtained at representative plants in the industry.

In 1910, 12 hr. per day were commonly worked by employees in the principal productive occupations of all departments, except sheet and tin plate mills and puddling mills, and by a few highly skilled Bessemer converter employees. It should, however, be thoroughly understood that 12 hr. per day on duty does not always mean 12 hr. of continuous labor.

In blast furnaces the nature of the process demands continuous operation. In this department of the industry in addition to the 12-hr. day the 7-day week was generally in force in 1910, making 84 hr. on duty per week. In many plants it was and is customary to divide the 24 hr. into shifts of 10 and 14 hr., 11 and 13 hours, or some other combination, but as employees alternate shifts weekly, their average becomes 12 hr. per day.

In 1910, according to the bureau's figures, 75 per cent of the employees in blast furnace productive occupations worked an average of 84 hr. per week, but in that year various relief systems began to be introduced which gave many employees one free day each week, so that by 1915 only 41 per cent of all blast furnace employees were regularly working 7 days of 12 hr. each, and in 1920 the percentage was reduced to 29. The 12-hr. day was worked for 6 days per week by a considerable number of the remaining employees in both 1910 and 1915 and no one worked less than 9 hr. per day. In 1920 the 12-hr. day was worked by 11 per cent of all blast furnace employees for 6 days per week, and by 23 per cent for 6 and 7 days alternately, in addition to the 29 per cent noted above as still working 12 hours per day on 7 days per week, making 63 per cent working 12 hr. per day, 7 or 6 days per week.

However, a very notable change had taken place by the limited introduction of the 8-hr. day, which was worked by 17 per cent of the employees in 1920 for 7 days per week, and by 1 per cent for 6 days. The introduction of the 56-hr. week, therefore, appears as a concomitant to the diminishing 84-hr. week.

Work in puddling mills is carried on only 6 days, or 6 days and 5 nights, per week, and puddlers, bushelers, and members of the muck rolling crews work little more than 9 hr. per day. In 1920 all told, 65 per cent of puddle-mill employees worked less than 60 hr. per week, 20 per cent worked an 8-hr. day, and an equal number, laborers and unskilled employees chiefly, worked a 12-hr. day.

Hours of Work in Steel Making

While, except in times of great demand, 7-day producing work is not obligatory in the two steel making departments—Bessemer converting and open-hearth—there has always been a certain amount of such work. When production is carried on only 6 days there must still be a considerable force of men on duty on the seventh day to prepare for the producing force, and the 84-hr. week has been prevalent to a considerable degree.

In 1920 among Bessemer converting employees, while the number working 7 days of 12 hr. each had been reduced 6 per cent since 1910, there were still over 75 per cent of all Bessemer employees working 12 hr. either 6 days or 7 days per week. Twenty-two per cent were on an 8-hr. day of 3 shifts, but as previously noted, these are mainly the highly skilled employees, such as steel pourers and stopper setters.

In 1920, among open-hearth furnace employees, 30 per cent were on an 8-hr. basis as compared with 1 per cent in 1910. This reduced the 12-hr. workers in open-hearth furnaces correspondingly from about 80 per cent in 1910 to about 50 per cent in 1920. One-third of all open-hearth furnace employees habitually worked 7 days per week.

Hours of Work in Rolling Mills

The 7-day week has been rare in the several classes of rolling mills during the 11-year period, except in blooming mills, and the 12-hr. day has prevailed much less in all rolling mills than in the iron smelting and steel making departments. Among sheet and tin plate mill employees less than 10 per cent worked 12 hr. per day in 1920, and from 60 to 70 per cent were on 8-hr. shifts. The average weekly hours of hot-mill crews in these two departments are either 42⅔ or 45⅓, that is, the three shifts work either 6, 5, and 5, or 6, 6, and 5 turns per week.

In rail mills the proportion of employees working a 48-hr. week (6 days of 8 hr.) jumped from 4 per cent in 1910 and 1915, to over 35 per cent in 1920, with a corresponding reduction in the number working a 72-hr. week (6 days of 12 hours). All told in 1920 about 60 per cent of all rail mill employees worked 12 hr. per day and 40 per cent were on 8-hr. shifts.

Among bar mill employees in 1920, 85 per cent worked less than 72 hr. per week as compared with 79 per cent in 1910, and the number working under 60 hr. had increased from 23 per cent in 1910 to 37 per cent in 1920. About 15 per cent of all bar mill employees were on 8-hr. shifts in 1920, and over 50 per cent were on 12-hr. shifts. Many 12-hr. employees, however, had a shorter Saturday turn and 33 per cent of all bar mill employees alternated 6 and 5 turns per week.

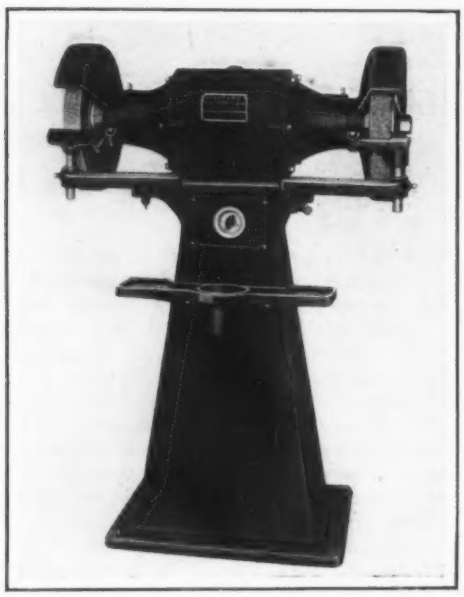
In blooming mills in 1920 about 60 per cent were on 12-hr. shifts with about 25 per cent on 8-hr. shifts. Eighteen per cent worked 7 days per week all or part of the time.

The Ramsdell Specialty Co., 667 West Boylston Street, Worcester, Mass., has been reorganized as the Ramsdell Tool & Mfg. Co., 116 Exchange Street, Worcester, Mass., and is equipped to manufacture screw machine products.

Alternating Current Grinder

A 2-hp. alternating current grinding machine, in both bench and floor type, has been placed on the market by the Standard Electric Tool Co., Cincinnati.

The machine is fitted with tool tray, water pot, tool rests and switch within easy reach of the operator, as shown in the accompanying illustration. Double row ball bearings are used. The regular equipment includes one coarse and one fine wheel each, which is 12 in. in diameter, 1½ in. face and 1 in. bore. The bench type machine is of the same construction except that



Alternating Current Motor Driven Grinder

it is equipped with a suitable base instead of the pedestal. These tools are for either 110, 220 or 440 volt, two or three phase, 60 cycle, alternating current.

The new machines are offered for use in machine or other shops where heavy or light grinding is required and as an improvement over belt-driven types in that they require no countershafts, belting, etc., and may be easily moved to any part of the shop.

Uses of Monel Metal Discussed

In view of the increasing use of Monel metal, it may be of interest to bring out a point developed in the discussion of a paper read last year before the mechanical section of the Engineers' Society of Western Pennsylvania. The authors, Edward S. Wheeler, assistant manager of the technical department, International Nickel Co., and Robert J. McKay, Mellon Institute of Industrial Research, University of Pittsburgh, mention the use of the metal in the process of pickling steel sheets and bars in sulphuric acid. While it appears that the original cost of Monel metal for containers for this work is greater than that of most of the anti-acid bronzes which are used, the resistance of the metal to the acid, combined with its strength and resistance to impact, and to amenability to re-working, make it cheaper in the final analysis.

It was brought out in a discussion by L. G. Firth, works manager Firth-Sterling Co., McKeesport, Pa., that at Sheffield, England, progress had been made in hardening Monel metal in a manner similar to steel. The International Nickel Co. has also been working on this problem. It has found that some reaction may be obtained from heat treatment, but nothing to compare with the tempering of steel. Experiments are still in process.

In answer to the increased demand for seamless tubes of Monel metal, the International Nickel Co. has been making a special effort to produce them commercially. However, the great strength of the metal at high temperatures has rendered the problem difficult. The billets must be very hot and evenly heated and the heating atmosphere must be carefully controlled at this high heat. As yet, the company has not been able to pierce a billet economically.

Automobile Production in 1921

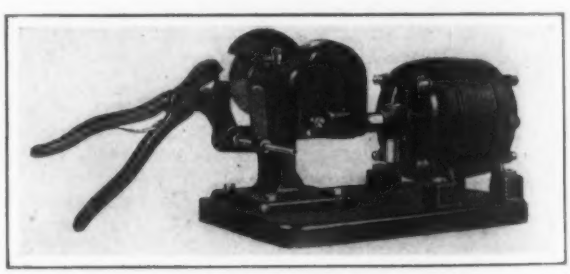
Figures of the National Automobile Chamber of Commerce, New York, show that the production in the United States of motor vehicles in 1921 was 1,668,550, of which 1,414,000 were pleasure cars and 154,550 were trucks. The wholesale value of the cars and trucks is given as $1,260,000,000, or an average of $756 per vehicle. Adding the value of parts and accessories and of tire replacement, the total output of the industry is placed at $2,212,000,000. This is based on a capital investment of $1,423,500,000, with 186,000 employees.

The number of cars produced during 1921 is greater than in any previous year except 1917, 1919 and 1920; the number of trucks is less than one-half those produced in 1919 and 1920, and about two-thirds the 1918 (war) output. It is estimated that 1,464,000 tons of iron and steel were used in the production of cars and trucks during 1921. There were also used about 20,000 tons of aluminum, 40,000 tons of copper, 12,510 of tin, 6670 of lead, 1500 tons of nickel, 800 acres of leather upholstering, 2000 acres of imitation leather, 120 acres of upholstering cloth and nearly 400 acres of glass, mostly plate glass. The hair and other padding for upholstering of seats and backs amounted to about 8000 tons. The paint and varnish used was about 5,900,000 gal.

Bench Type Metal Saw

A bench type saw for the rapid cutting of small or medium-size cold rolled steel, drill rod and other metals is being marketed by the Triangle Metal Products Corporation, Rochester, N. Y.

The machine is shown in the illustration. It is built in two sizes, the No. 1 being for work ⅛ in. to ½ in. in diameter and the No. 2 for work ½ to 1 in. Saws are interchangeable. They are 1/32 in. thick and are



The Material Being Sawed Is Held by Device Shown at Left

hollow ground to give a clean, true cut, which is pointed out as effecting a saving of metal, reducing waste to the mere thickness of the saw.

The cutting capacity is claimed to be that of several men using a hacksaw, the volume being limited only to the skill and ability of the operator. An instance of 1800 pieces of 3/16-in. brass rod having been cut in an hour is given.

Material is quickly placed in position for sawing and held firmly by the device shown. A stop or butt is provided for adjusting the length of cut desired. The drive is by a ⅛-hp. motor taking power through an electric light cord, which makes it available for use wherever there is access to a lamp socket. The machine may be equipped for either direct or alternating current.

On Monday, May 28, N. & G. Taylor Co., manufacturer of tin plate, Philadelphia, now in its 113th year, was represented at the luncheon given by the Philadelphia Chamber of Commerce to the Association of Centenary Firms and Corporations. A few moments' thought makes one realize that the firms represented were doing business before the days of coal, gas, railroads, electricity—some long before the days of steam or banks and even before there was a State of Pennsylvania.

Commercial Evidence of Better Business*

What Trading Data There Are Which Bear Out Recent Conditions in Finance and Parallel Recovery in Industrial Operations

BY NATHANIEL R. WHITNEY†

THE third classification of evidence as to the business situation deals with commercial or trading data. This may be conveniently grouped under seven main heads.

1. Commodity prices. The tendency for some months has been toward greater stability of commodity prices. The department of labor index shows a rise of less than 1 per cent for March as compared with February. March was the tenth month during which the average price level remained fairly stationary. Relative prices compared with 1913 as normal are presented in the following table.

1913 average equals 100

Commodities	1922 February	1922 March
Farm products	126	128
Metals	115	114
Food, etc.	138	138
Chemicals and drugs	159	159
Cloths and clothing	183	182
Fuel and light	183	183
Building materials	202	202
House furnishings	213	213
Miscellaneous	150	153

Much has been said in recent months about the unfortunate situation of the farmers, resulting from the heavy decline in the price of agricultural products. This subject deserves to be emphasized inasmuch as an increased purchasing power on the part of the farmers is a requisite for any real progress toward normal. A. B. Genung, of the Department of Agriculture, indicates the position of the farmer very clearly in an article published in a recent number of the *Annalist*. He lists the relative purchasing power of various farm products in terms of all other commodities as follows:

Cotton	85	Beef cattle	61
Corn	63	Swine	80
Wheat	98	Eggs	68
Hay	74	Butter	84
Potatoes	116	Wool	99

But this does not show the producers' true position since it does not show how much of the various products they have on hand to sell. The subjoined table shows the gross farm inventory for March, 1922, compared with the ten year average for March.

	March, 1922	10-Year Average
Corn	$1,466,000,000	$2,307,000,000
Wheat	768,000,000	1,027,000,000
Hogs	573,000,000	791,000,000
Potatoes	390,000,000	331,000,000
Cotton	676,000,000	1,075,000,000
Milk cows	1,224,000,000	1,163,000,000
Beef cattle	982,000,000	1,232,000,000
Sheep	173,000,000	296,000,000

2. Volume of retail trade. From 44 cities in the United States and Canada reports to Bradstreet's indicate that wholesale and jobbing trade is fair to quiet, none reporting it good; retail trade is reported good in only one and "quiet" and "fair" in the remaining. Figures are usually reported from three types of business—department stores, mail-order houses, and chain stores. The department stores reporting to the New York Federal Reserve Bank for March, 1922, showed on the average a loss of 8 per cent in sales for the month as compared with March, 1921; and for the first quarter a loss of 7 per cent as compared with the first quarter last year. According to Bradstreet's, 446 reporting stores showed a decline of 14.5 per cent in sales for March, 1922, as compared with March, 1921; and of 12.8 for the first three months of 1922 as compared with the same period for 1921. Sales of the two leading mail-order houses are reported as follows:

	April, 1921	March, 1922	April, 1922
Sears-Roebuck	$16,375,290	$15,801,061	$14,712,632
Montgomery Ward	6,464,073	8,031,474	7,357,640

	1921 (First 4 months)	1922 (First 4 months)
Sears-Roebuck	$66,082,259	$57,115,423
Montgomery Ward	25,043 393	26,767,952
Total	$91,125,652	$83,883,375

Decrease of 7.9 per cent

In May, for the first time since the summer of 1920, sales of Sears-Roebuck Company are showing a definite increase. The sales of chain stores have held up better than in the other two groups. Sales in 1155 stores of the Woolworth company during the first four months of 1922 showed a net gain of 11.46 per cent over the corresponding period of last year. The reports from chain drug stores and cigar stores showed for March of this year a decline of 3 and 6 per cent respectively as compared with March of last year.

3. Bank clearings. Since it is estimated that between 90 and 95 per cent of all commercial transactions in this country are settled by means of checks the bank clearings in the various cities throw light upon the volume of business at a given period. The figures for the first four months of this year are given below in comparison with those for several previous years:

(Six figures omitted)

	1918	1919	1920	1921	1922
January	$25,485	$31,504	$40,408	$31,536	$28,931
February	20,953	24,281	31,251	24,985	25,530
March	24,502	28,186	38,792	29,031	30,954
First quarter	$70,940	$83,971	$110,451	$85,552	$85,415
April	24,831	28,771	37,224	27,130	30,440

4. Stock market operations. Figures showing the volume of trading on the stock exchange are of importance not only because they indicate trading activity which is the result of industrial activity, but also because they show, if the activity is accompanied by rising prices, that investors and speculators have confidence in the upturn of business. Trading during April was the heaviest in two years. At the same time representative averages of industrial and railway securities rose to the highest level since the fall of 1920. Averages of industrial stocks showed a nearly unbroken rise of about 30 points since last August; and railroad stocks averaged about 15 points from the lowest of last year. During the first three weeks in April transactions on full trading days did not once fall below a million shares, and on April 17 reached two million shares for the first time since April, 1920. The value of bonds traded in on the New York exchange for the first four months is indicated in the following table. The sales of stock for the same period were, 1921, 58,165,387 shares; 1922, 86,101,998 shares.

	1921	1922
Railroad bonds	297,344,500	683,195,650
U. S. Government bonds	607,890,600	715,691,700
State, foreign, etc.	82,683,100	221,713,500

5. Car loadings and idle cars. Due almost entirely to smaller shipments of coal, freight loadings

*Concluded from page 1458, THE IRON AGE, May 25.

†Professor of finance, college of engineering and commerce, University of Cincinnati.

declined 14 per cent in the first week in April. There were increases in loadings of manufactured goods, forest products and ore, and miscellaneous freight. Previous to April 1, loadings were unusually heavy for the season and showed weekly increases. This was due in part to shipments of coal in anticipation of the strike. The number of idle cars and the number of cars loaded during recent weeks follows:

Idle Cars		*Car Loadings*	
March 8	394,980	March 18	823,369
March 15	390,617	March 25	846,035
March 22	380,434	April 1	827,001
March 29	367,687	April 8	714,268
April 8	419,267	April 15	706,713
April 15	493,055	April 22	714,088

6. Foreign trade. The trend of our foreign trade is hard to define. During the first two or three months of the year, both exports and imports seemed to be on the up-grade, March exports of $332,000,000 being the largest since October, and imports of $258,000,000 being the largest since December. But a slump occurred in April, exports dropping to $321,000,000, and imports to $217,000,000. For the ten months of the fiscal year, ending with April, exports were valued at $3,131,000,000, as against $5,850,000,000 during the corresponding period of the year before. In some lines there has been a notable increase in the value of exports. For example, exports of corn have reached new high levels, and the foreign orders of the United States Steel Corporation are up nearly to the highest point reached before the war. The trend of our foreign trade is bound to be uncertain so long as instability in the value of foreign moneys exists, and so long as some members of Congress insist on fastening upon the country the millstone of a high protective tariff. It requires the exercise of very little intelligence to realize that we cannot sell goods to other countries unless we buy from them, nor can we expect them to pay their obligations to us unless we are willing to receive their payments.

7. The foreign exchanges and foreign conditions. Since the foreign exchanges reflect the value of foreign currencies we may get an idea as to the purchasing power of some of our customers by considering the rates of exchange. The following table presents these rates for the past sixteen months for certain countries:

Foreign Exchange Cable Rates in Dollars per Monetary Unit
(As of 15th of month)

1921	London	Paris	Italy	Germany	Netherlands	Switzerland	Argentine	Canada
Jan.	3.7362	.0609	.0345	.0150	.3287	.1557	.3430	.8725
Feb.	3.9200	.0738	.0369	.0171	.3448	.1660	.3456	.8763
Mar.	3.9043	.0699	.0369	.0160	.3435	.1710	.3391	.8725
Apr.	3.9225	.0712	.0471	.0159	.3470	.1731	.3179	.8825
May	4.0062	.0859	.0561	.0176	.3629	.1803	.3013	.8938
June	3.7825	.0807	.0510	.0144	.3314	.1686	.3066	.8918
July	3.6275	.0780	.0451	.0134	.3186	.1651	.2872	.8756
Aug.	3.6650	.0781	.0440	.0116	.3113	.1690	.2925	.9000
Sept.	3.7100	.0707	.0426	.0092	.3137	.1718	.3034	.8919
Oct.	3.8962	.0732	.0403	.0066	.3394	.1922	.3200	.9125
Nov.	3.9669	.0725	.0415	.0038	.3490	.1888	.3254	.9119
Dec.	4.1775	.0793	.0453	.0052	.3638	.1940	.3318	.9244
1922								
Jan.	4.2312	.0823	.0444	.0055	.3687	.1944	.3338	.9475
Feb.	4.3537	.0863	.0486	.0050	.3729	.1949	.3651	.9625
Mar.	4.3412	.0889	.0502	.0037	.3755	.1942	.3599	.9650
Apr.	4.4175	.0929	.0546	.0034	.3795	.1947	.3566	.9775

Further light upon the condition of European countries may be obtained by noting the position of their banks and the price of their funded debt. The official discount rate in Germany, Belgium, France, Denmark, and Sweden, is 5 per cent; in Italy, Norway, and Spain, it is 6 per cent; Holland, 4½ per cent; Bank of England, 4 per cent; and Switzerland, 3½ per cent. The note circulation of the Bank of England on May 3 was £122,090,000, as compared with £129,528,235, at the same date last year. The Bank of France had on May 4 notes outstanding to the amount of fr. 36,178,276,000, as compared with fr. 38,832,838,855 on the same date last year. Commercial bills held by the Bank of France declined from 3309 million francs at the end of 1920 to 2506 million at the end of 1921, and to less than 2300 million early in 1922. Bills matured but extended at the outbreak of the war, which at the end of 1918 amounted to 1029 million francs, were reduced by the end of 1921 to 57 million. This gradual improvement in the economic situation in Europe has resulted in an advance in the price of European securities, so that in April nearly all the foreign issues listed on the New York exchange reached new high prices for the year. Conditions in Europe as well as in Asia, particularly in India and China, are still very much unsettled. They will be likely to continue in this state until the United States takes its logical position as leader in the economic and political rehabilitation of the world. We ought to be willing to take this position from a sense of duty and a desire for service to our fellow men; but even though these virtues apparently are lacking, it would seem that we cannot much longer blind ourselves to the fact that restoration to anything like normal economic conditions, even in our own country, waits upon our recognition of the fact that we are not living in a self-contained world.

British Electric Steel Industry

Valuable data concerning the present status of the electric steel industry of Great Britain are contained in a recent pamphlet on the "Steel-Making Facilities of Great Britain," written by H. B. Allin Smith of the Bureau of Foreign and Domestic Commerce, Washington. The following table gives the number and size of such furnaces at the beginning of 1922:

Unit Capacity	No. of Furnaces	Capacity per Charge
5 hundredweight	1	0.25
6 hundredweight	1	0.30
½ ton	15	7.50
18 hundredweight	2	1.80
1 ton	5	5.00
1¼ tons	1	1.25
1½ tons	19	28.50
2 tons	20	40.00
2½ tons	3	7.50
3 tons	18	54.00
3½ tons	6	21.00
4 tons	5	20.00
5 tons	3	15.00
6 tons	11	66.00
7 tons	10	70.00
7½ tons	2	15.00
10 tons	8	80.00
15 tons	2	30.00
20 tons	1	20.00
Miscellaneous (estimated at 1½ tons)	15	22.50
Total	148	505.60

Records show that 16 firms had about 21 electric furnaces in their equipment during 1914, and this score of furnaces ranged within the narrow limits of 1 to 3½ tons per charge. In 1922 there are nearly 150 installations with a range from 5 hundredweight to 20 tons per charge, the majority holding around 2 tons, but 60 or more of them being in the 3-ton class and larger.

American Mining Congress at Cleveland

A representative committee of prominent Cleveland coal and iron ore operators has been formed to cooperate in carrying out the plans for the twenty-fifth annual convention and exposition of mines and mining equipment of the American Mining Congress to be held at the Public Hall, Cleveland, Oct. 9-14, 1922.

Richard F. Grant of M. A. Hanna & Co. was elected chairman general Cleveland committee; John A. Penton, Penton Publishing Co., vice-chairman; Michael Gallagher, president, Pittsburgh Vein Coal Operators' Association, chairman of the speakers' committee; and Charles E. Adams, Cleveland Hardware Co., chairman exposition committee.

The exposition of mines and mining equipment on the basis of present indications will be by far the most comprehensive display of mine equipment and mine machinery ever assembled in this country. It is expected that there will be from 200 to 225 representative industrial displays on the exposition floors at Cleveland, in addition to a series of notable public exhibits.

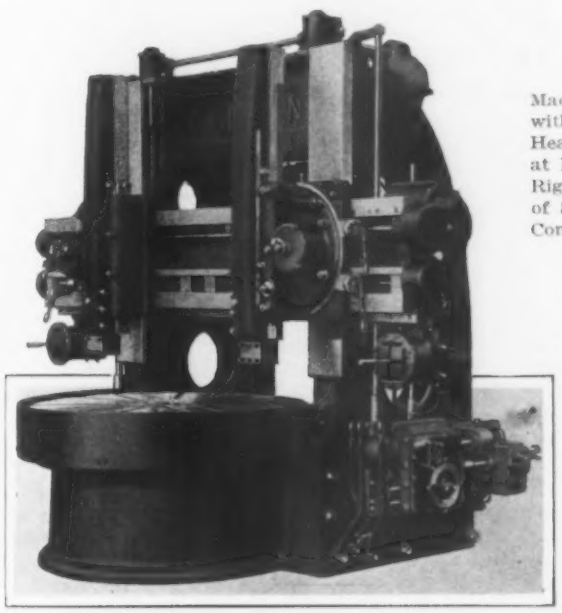
The Public Hall in Cleveland, which was formally opened for the Building Exposition in May, is one of the finest buildings of this character.

NEW HEAVY DUTY BORING MILLS

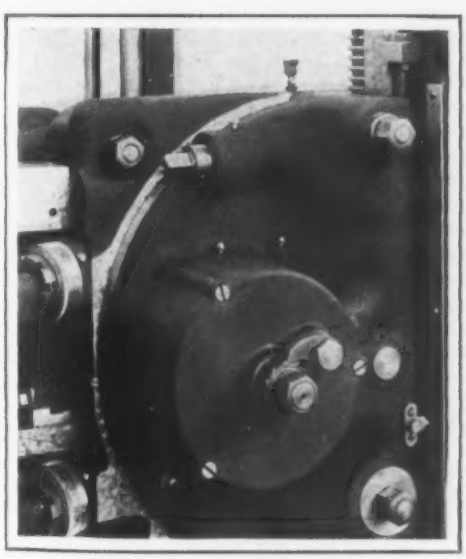
Single Lever Control for Feed and Rapid Traverse of Head and Ram—Spring Suspension of Ram

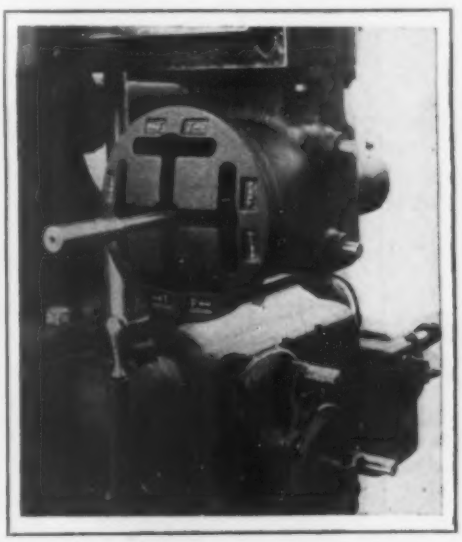
The Colburn Machine Tool Co., Cleveland, has placed on the market a new heavy-duty, vertical boring and turning mill, shown in the accompanying illustrations, built in six sizes from 42 to 84 in. The new machine is said to have been in the experimental stage for the past two or three years and that thorough tests have proved it to be a very practical design.

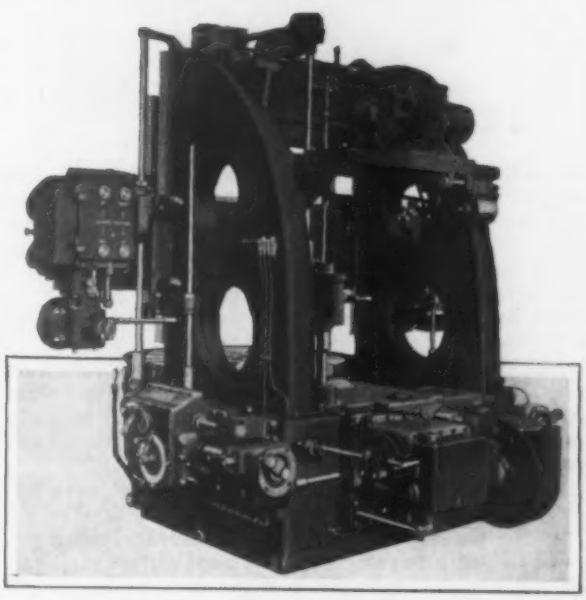
The outstanding features include single-lever control for the feed and rapid traverse mechanism of the head and ram, spring suspension of the ram and turret slide, an automatic, gravity lubricating system and close adjustment ratchets carrying micrometer dials mounted on the head. The capacity is given as 2 in. over the rated size.



Machine Equipped with Two Swivel Heads Is Shown at Left. View at Right Is Close-up of Single Lever Controlling Head and Ram







Rear View Above Shows Mounting of Motor and Other Details. View at left is close-up of spring counterweight

The table is cast solid and an unusually large amount of metal provided over the T slots. A plain table is regularly provided, but a three-jaw combination chuck or a four-jaw independent chuck can be furnished for mills up to 54 in. The table spindle revolves on a chilled cast-iron self-centering angular bearing of large diameter and there are also two vertical bearings to resist tool thrusts and strains. The chilled cast-iron surface bears on a scraped angular surface cast integral with the bed. The table has 12 speed changes in geometrical progression, which are obtained by sliding gears and hardened positive clutches. Both the back-gear lever and the speed-change lever are at the front right-hand side of the machine for convenient manipulation from the regular working position. Gear shifts are made by means of a patented cam arrangement. A starting and stopping lever is located at the front on both sides of the machine and the brake acts simultaneously with the disengagement of the driving clutch. Single-lever controls for operating the feed and rapid traverse of the heads are also located on each side of the machine, in front.

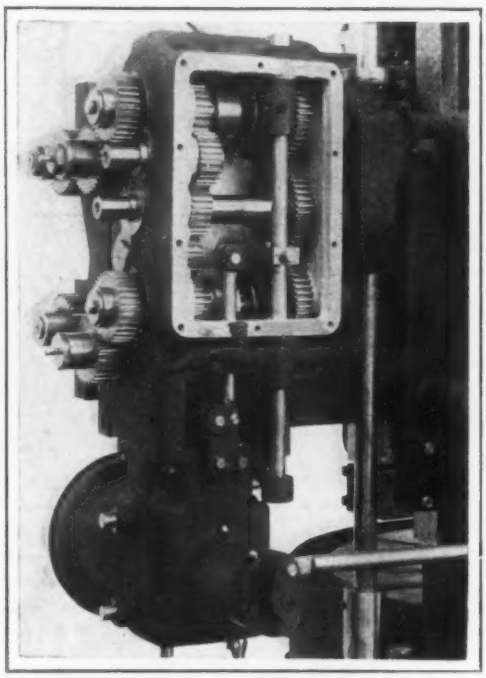
The drive consists of primary and secondary speed units. The primary speed change-gear box provides four changes and the secondary, located within the bed, gives three changes. Power is through a single pulley and disk clutch, eliminating belt shifting to obtain speed changes. Shafts are of large diameter and of high-carbon steel, ground and mounted on ball bearings.

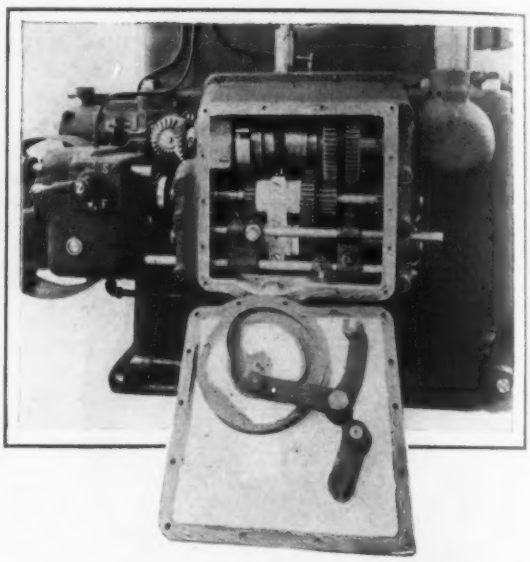
The driving gears are held in position by keys and spacers and practically all are of chrome nickel. They are of large diameter, wide faced, of coarse pitch and stub toothed, and are heat treated when the size permits. Radial and thrust ball bearings are used throughout the drive, in the clutch pulley and in the rapid traverse unit.

The narrow guide bearing type of crossrail is massive and heavily ribbed. Projecting handles and clutches have been eliminated in the interests of safety. Ball-thrust bearings at the end of the cross-feed screws

and a vertical feed worm are intended to eliminate wear and reduce the power required to drive the feed. Feed rods and screws are of large diameter. The cross rail is raised and lowered by power independently of the table drive, through worm and gears in oil-tight cases located on top of the housings, this being accomplished by engaging a multiple disk friction clutch running in oil.

The heads are massive and are independent in their movements both as to direction and amount of feed. Each head is operated by a single-lever control through separate feed boxes. Either head can be brought to the center of the table for boring, the exact position being determined by a center stop. Close adjustments of the heads are made by patented ratchets mounted on the saddles. The saddle bearings on the rail are made long to reduce the possibility of binding and undue wear and the saddles have adjustable taper gibs to compensate for wear. In addition to the regular clamping bolts, long bolts are used for clamping the swivel to the saddle when the ram is in a vertical position, the extra bolts being placed at the point of greatest strain and intended to provide added support to the entire head. This, it is pointed out, is a distinct advantage when heavy cuts are being taken. A turret head which does not swivel is provided when desired and is located on the right-hand side, replacing the regular swivel head.





Feed Clutch Gear Box at Rear of Rail and Also Gears at End of Rail, Shown at Left. View at right is inside of feed box showing sliding gears, etc.

The rams are of heavy box section and have long vertical bearings in the swivel. They are scraped and fitted to the swivel, three taper bearings being provided for adjustment. An inset high-carbon steel rack extends the entire length and the rack pinion is stub toothed and of chrome nickel steel. A scale and pointer are provided on the rams and turret slide. The rams swivel 45 deg. either side of the vertical position, this angular adjustment being accomplished by a worm and segment wholly inclosed in the head. Graduations on the swivel indicate the angle. A rapid means for setting the ram at any angle is thus provided and the mechanism also acts as a safety lock to prevent tipping when the swivel clamping bolts are loosened.

Counterweighing of the ram and turret slide by the use of a spiral spring permits a crane hook to be brought directly over the center of the table without interference, in placing heavy work. There are no counterweights to take up floor space, holes are not required in the floor, and there are no cables or chains to slide off the sheaves. The spring is inclosed within a heavy steel drum which in turn is fitted into an opening in the head and the spring can be removed from the head without uncoiling. A ratchet provides for adjustments of the spring to any desired tension so that heavy tools can be properly counterbalanced.

The complete control of the head and ram for both feed and rapid traverse by single lever is declared to represent a marked improvement in vertical boring mill construction. The lever is thrown in the direction of the movement desired, whether feed or rapid traverse. When the rapid traverse is engaged the feed is disengaged and vice versa, and the rapid traverse always operates in the opposite direction from the feed in each slot shown on the control plate. This prevents engaging the traverse in the same direction as the feed. There are 16 feed changes in geometrical progression from 0.006 to 1 in. for both horizontal and vertical movements.

The power rapid traverse provided permits the head to be moved at the rate of approximately 12 ft. per min. horizontally, vertically and in angular direction and may be operated with the table in motion or at rest. The traverse is engaged through a multiple-disk friction clutch located in the feed box. Final adjusting ratchets for vertical and horizontal movements are mounted on the heads and carry micrometer dials reading in thousandths of an inch.

Automatic lubrication is provided, eliminating as far as possible the human element and the necessity for manual oiling. The secondary speed box forms the oil reservoir, the driving gears and bearings being lubricated by the splash system. Oil is pumped to a cored chamber in the top brace, from where it flows to the feed cases, feed multiplying units, primary drive, spindle bearings and elevating device, passing through eight oil feeders on each side of the machine where the rate of flow can be seen by the operator. The clutch boxes at the rear of each end of the rail are filled with oil to the proper level as indicated by an oil cup. The gearing carries the oil to the upper part of the box, providing lubrication of gears, clutches and bearings. All units not automatically lubricated are run in oil baths.

Oil for the vertical and angular spindle bearings is piped from the tank in the top brace to the outer edge of the angular bearing and by gravity the entire length of the vertical bearings back to the reservoir in the bed. The overflow from the angular bearing keeps a supply of oil on the table gear and pinion and also lubricates the pinion bearing. The table spindle has spiral oil grooves cut on the vertical bearing surfaces and is provided with an automatic lubrication.

The machine is driven by a constant speed motor not exceeding 1200 r.p.m. mounted on a bracket between the housings, as shown. An idler pulley maintains the proper belt tension. A 10-hp. motor is recommended for the 42- and 48-in. machines, 15-hp. motor for the 54-in. machine, and a 20-hp. motor for the 72- and 84-in. machines.

Jobbing Trade Sees Up-Grade in Steel

Caution Against Price Advances That May Be Followed by Reaction—A Great Growth in the Use of Cold Rolled Steel—Views on Pittsburgh Plus

WASHINGTON, May 30.—Carrying a cheerful tone as to present and prospective business conditions, the 13th annual convention of the American Iron, Steel and Heavy Hardware Association was held at the Washington Hotel here last week. The sessions began on Tuesday morning and adjournment came at noon Thursday. Approximately 150 active and associate members attended. Among speakers outside the trade who addressed the convention were Secretary of Commerce Herbert Hoover and General Counsel James A. Emery of the National Association of Manufacturers. The former spoke on the work of the reorganized Department of Commerce and its efforts to serve the needs of the business men of the country. Mr. Emery spoke interestingly on "Combination and Business."

The Betterment in Business

In opening his remarks, retiring President Andrew Wheeler, Morris, Wheeler & Co., Philadelphia, stressed the improvement in business during the past three months. He spoke of the work of President Harding in endeavoring to stabilize economic conditions, the accomplishments of the peace conference, and the recovery of the steel trade from the serious depression of last year. The difficulty that has been faced regarding steel distribution was pointed out, but Mr. Wheeler said that the manufacturers have been hit harder than warehousemen. He was prone to believe that the improved business condition of the past three months was due to normal increase in demand and was not sure to what extent it was on account of the coal strike. Improvement in steel plant operations, it was pointed out, is likewise being felt by the steel warehouses, although the latter will feel the full effects of it a little after it reaches the manufacturer. Mr. Wheeler said that while people have expressed the opinion that the coal strike has had a good deal to do with increased operations, the fact remains that building operations on a large scale formed the first real tonnage which marked the beginning of the improvement. It was stated that this was followed by larger purchases by the railroads "who are now reaping the benefits of the wartime passenger and freight rates, which are still in existence." On the day following his address the Interstate Commerce Commission handed down its decision in the general rate case cutting rates by 10 per cent. Mr. Wheeler declared this was inadequate and said he did not think jobbers could reflect the reduction in their prices and that the cut would mean a reduction of only 72c. per ton for jobbers on shipments from Pittsburgh to Philadelphia.

Mr. Wheeler in his address mentioned the new impetus in the automobile industry, the large amount of money in this country and the necessity of settling the foreign exchange situation before Europe can readjust finances so as to be able once more to engage largely in world-wide export and import business. He expressed the view that consolidation of independent steel companies now being proposed will work to the ultimate advantage of the warehouses.

"There are a number of other matters which will have a distinct bearing on our business," Mr. Wheeler declared, "including the question of the Pittsburgh base and the new tariff bill and shipping bill. While I would deprecate anything like a runaway market, I do believe that prices should be adjusted to a point where the manufacturers can make a fair return to their stockholders, which has not been possible during the past 18 months."

Throughout the convention there was a warning against a runaway market with the resulting inflation in prices with the inevitable reaction and collapse. It also was the unchallenged opinion that wages in the steel and jobbing business are going to advance soon, resulting in higher costs and market prices. Discussion of the Pittsburgh base showed that the convention was strongly in favor of its being maintained as a means of giving stability to the market.

Middle West the Great Sheet Market

Commenting on present conditions of the steel market, William L. Hoffman, of the Philadelphia office of the Brier Hill Steel Co., dealt particularly with the situation as to sheets. He made the interesting statement that about 70 per cent of the sheet production is distributed in the Middle West, about 28 per cent in the East, and less than 2 per cent in the Far West. Approximately 72 per cent of the output is comprised of blue annealed, black, and galvanized sheets while the remaining 28 per cent goes into specialties. Mr. Hoffman spoke of the activity of the sheet market and said that it reflected the condition of the automobile industry, which built more cars in April than in any calendar month in the history of the industry. It was declared that steel sheets are replacing other materials and are proving more satisfactory. Pointing out that there are 69 sheet plants in the United States, with 601 hot mills and 43 jobbing mills, Mr. Hoffman said that production in January was at the rate of 50 per cent and was about 170,000 net tons. The output had increased to 290,000 net tons in April, representing operations at 80 per cent of capacity while present operations, Mr. Hoffman said, are at the rate of 86 per cent.

Discussing future conditions from the point of the salesman, Mr. Hoffman said that the prospects are good, regardless of what angle is taken. He warned salesmen against being too eager to make sales. "The future," he said, "is in our own hands. We should buy and sell conservatively, because we are rebuilding a permanent structure."

Admonition was given to the convention by C. C. Hadly, Alan Wood Iron & Steel Co., Philadelphia, "not to allow the inflation bug to warp our vision." He pointed out that undoubtedly the steel market, particularly plates, had been over-liquidated and that there now is a reaction under the law of supply and demand, and that cost and selling price lines are in parallel relation. He said it would seem that the market is in a period of secondary inflation. Raw, semi-finished and finished material show that prices have been unduly depressed and are seeking a level more in proportion to what they should be. In the speaker's opinion labor is going to be higher within the next three months; it has been unduly low. Railroad and building labor, it was asserted, has not followed the decline in wages in the steel industry. Mr. Hadly said that as long as the proper relation between cost and selling prices is kept steadily in mind, he was unable to see anything but prosperity, but he emphasized the danger of inflation, with its inevitable bad reaction.

The Pittsburgh Base

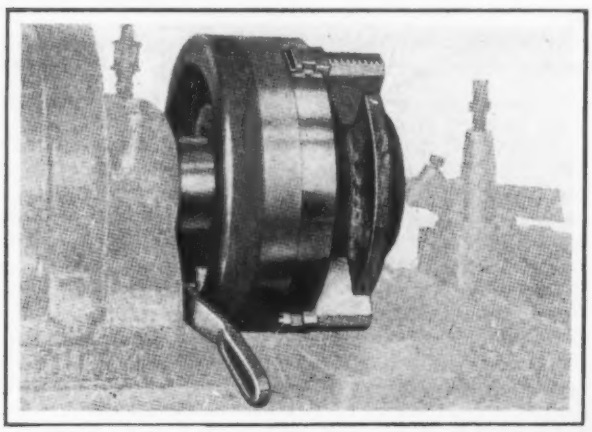
On the question, "What Would Be the Effect of Abandoning the Pittsburgh Base?" the discussion showed sentiment strongly in favor of maintaining the Pittsburgh base because of its stabilizing influence in the market, not only for manufacturers but for warehousemen as well. S. L. Orr of the Orr Iron Co., Evansville, Ind., said that Chicago jobbers buy steel at from $6 to $8 per ton cheaper than some other Western distributers. It is obvious, he added, that Chicago warehouses are able to handle steel as cheaply as any other warehouses. Only one result would follow—the

(*Continued on page* 1565)

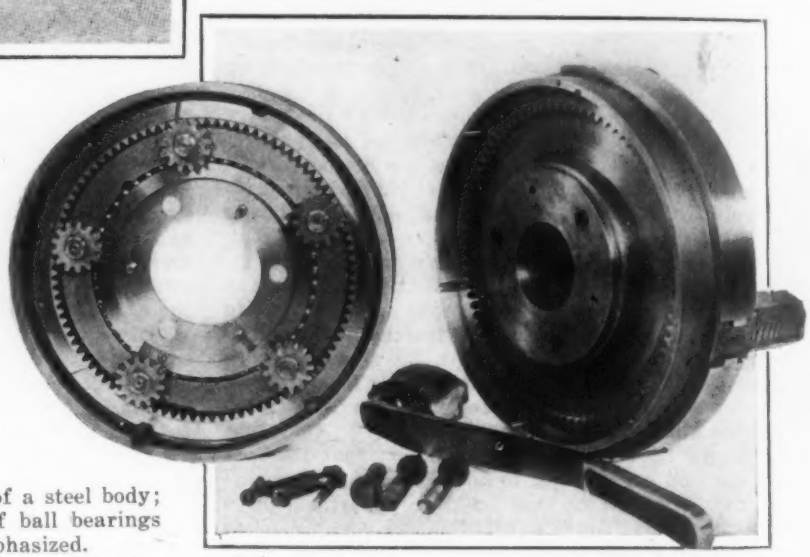
Lathe Chuck of New Design

The differential chuck shown in the accompanying illustrations is a new design of the E. Horton & Son Co., Windsor Locks, Conn., and was developed to secure greater power, speed of operation and wrenchless handling of scroll chucks, a type regarded as best suited for production work.

The features of the new design include the powerful grip obtained by differential gearing of high ratio and through the balanced drive of five pinions instead of one. Quick and convenient wrenchless operation by hand or power from the machine spindle is provided. Complete range for all sizes of work by simply running the jaws, which grip outside and inside, exerting full pressure at all points in all positions, is a feature. Simplicity of design and directness of action; superior wearing quality due to larger bearing surfaces, balanced drive and better lubrication; strength and stiffness inherent in the design and increased by the use of a steel body; and easy running assured by use of ball bearings of large size, are other features emphasized.



Differential Hand or Power Operated Chuck. Component members are shown at right, and as mounted on a lathe, above



The overhang from the face plate is no greater than in the regular type of scroll chuck. The jaws, which are of the reversible top style, are the same as standard for a larger size of ordinary chuck, those for a 13-in. differential being the same as used in the 15-18 in. sizes of the regular scroll chucks. Blank tops or solid blank jaws can be provided.

To operate the chuck the hand wheel at the back is revolved until the jaws close to the work, when the grip is tightened either by a quick push on the hand wheel or by starting the machine and exerting pressure on the lever. To open, a quick pull on the hand wheel releases the grip and the jaws then being run out to clear the work by a spin of the wheel.

The principle of operation is that of differential pinions operating with internal gears. The hand wheel carries five double pinions meshing with the backing gear, which is pinned to the body, and an internal gear, on the reverse side of the scroll, of different pitch diameter than the backing gear. When the hand wheel is revolved the scroll rotates in the chuck with a powerful gear multiplication because of the differential action due to the difference in pitch diameters. With the gear ratio as regularly furnished one revolution of the hand wheel moves the jaws 1/32 in. radially, opening the chuck approximately 1/16 in. in diameter.

An important feature is the device for locking and releasing the chuck. By allowing the backing gear a slight rotation on the pins which hold it to the body a lost motion is imparted to the hand wheel. This lost motion serves to furnish a hammer action multiplying many times on the scroll the actual pressure applied to the hand wheel. The lever is bolted to the machine and carries a friction shoe acting on the inside of the hand wheel. This is used, when power operation is desired, to hold the hand wheel stationary while the chuck revolves. The gripping power obtained by this means is stated to be greater than possible with any wrench-operated chuck.

The diameter of the body of the chuck shown is 13⅜ in., the thickness 5 in. The face plate recess is 7 in. and the center hole 3 in. Jaws are 3 in. high, 1 9/16 in. wide, and 5⅝ in. long.

Nickel Coated Steel Sheets

Experiments with a view to making nickel-coated steel sheets as a substitute for tinplate have been in progress for about 12 months, says the London *Ironmonger*, at the works of the Cwmfelin Steel & Tinplate Co., Ltd., belonging to Richard Thomas & Co., Ltd., and it is stated that among those interested in the process is Henry Mond, son of Sir Alfred Mond, the head of the large nickel company. In spite of the optimistic reports which have appeared in the press the experiment so far does not seem to have been commercially successful, although some samples have been produced.

The aim of the process is to produce a steel sheet coated with nickel, just as sheets coated with tin are now manufactured. Practical tinplate makers are skeptical as to the possibilities of obtaining a sufficiently ductile product, and this want of ductility appears to be one of the principal difficulties to be overcome. No results of tests are at present procurable, and contrary statements which have appeared principally reflect current gossip.

It is interesting to note that in 1920 a company was registered called the Steel Nickel Process Syndicate, Ltd., with a nominal capital of £6,000 in 1s. shares, of which up to Aug. 7, 1921, £5,000 had been issued, 10,000 shares having been paid in cash, and 9,000 being credited as fully paid. This company was formed to acquire the invention of Hezekiah Jones, engineer, of Strawberry Place, Morriston, Swansea.

Some years ago one of the important Welsh steel and tin plate concerns laid down a plant for the production of aluminum coated steel sheets, which, it was suggested, would supplant tin plate in the manufacture of food containers and domestic ware. The product, however, did not prove popular, and although efforts were made to interest the biscuit manufacturers and other large users of the material, the process was not a commercial success, and in the end the plant was scrapped.

The Buffalo Machine & Iron Corporation, Buffalo, has been incorporated with a capital of $500,000 and will manufacture sugar mill machinery, engines and other products.

STEEL TREATERS AT PITTSBURGH

Second Sectional Meeting a Success—Technical Papers and Discussion

Much credit is due the committee which formulated the program of the Pittsburgh sectional meeting of the American Society for Steel Treating held at the Pittsburgh station of the Bureau of Mines, May 25, 26 and 27. It was the second sectional meeting to be held under the plan of the board of directors of the national body. The first sectional meeting was held recently in New York. The Pittsburgh sectional meeting brought together the chapters located in Pittsburgh, Cleveland, Rochester, N. Y., Syracuse and Buffalo. The registration was over 200.

Fiber in Iron and Steel

Prof. F. F. McIntosh, Carnegie Institute of Technology, Pittsburgh, was the opening speaker at the technical session on the afternoon of May 25. His subject was, "Fiber in Iron and Steel." His talk, which was informal, was illustrated with photomicrographs of wrought iron, soft steel, steel plate and forging steel. He disagreed with text books which say that wrought iron is not fibrous, although admitting that the terms "fiber" and "grain" were not very clearly defined, probably because of the confusion which exists in microstructure and macrostructure tests. He thought that since wrought iron was the only material suitable for staybolts, it was a subject well worthy of research effort. In support of his contention that this material was fibrous, he adduced the markedly greater strength on longitudinal than transverse tests. Touching on soft steel, the speaker noted that the difference between the longitudinal and transverse tests was less than in wrought iron. Such steel, his experiments showed, lacked the long stringers of ferrite noted in wrought iron, at least not in the microscopic test. Steel plate, running moderately high in carbon, showed no fiber in either the longitudinal or cross sections, nor in the test pieces under microscopic examination, but, when etched, the fiber appeared to be piled up like the leaves of a book.

The speaker ascribed the cause of fiber to non-metallic inclusions. These come as the steel solidifies and while carbon diffuses, the other non-metallic elements remain. Fiber persists in all treatments and while it is masked in heat treatment, it remains. The discussion brought out that the cooling had much to do with the presence of fiber. In this connection it was pointed out that on account of the smaller ingot, quicker and more complete chilling was possible in crucible steel than in the larger masses and this meant less dendritic growth and a finer grain in crucible steel than that made in larger refining units. In response to a question as to whether elimination of the fiber would give a better material, Professor McIntosh declined to commit himself. He urged the microscopic examination of steel as the making of steel to chemical specification alone was taxation without representation.

A paper by John M. Lessels, Westinghouse Electric & Mfg. Co., East Pittsburgh, on "Impact Tests," which detailed results of the Izod, Charpy, Fremont impact testing machines and the Stanton repeated impact testing machine, aroused a lively discussion as to what was gained by the test in view of the varying results from the different machines. E. E. Thum, associate editor *Chemical and Metallurgical Engineering*, presented lantern slides showing charts of tests made at Watertown, Mass., and Indianapolis, of the Izod, Charpy and impact shear machines. Mr. Thum urged the impact shear as the one leading to most definite results.

Progress in Steel Metallurgy

Dr. John A. Mathews, president Crucible Steel Co. of America, was the principal speaker at the informal dinner given at the University Club in the evening. His subject was, "Metallurgical Miscellany." While there is much general information about steel, the speaker said, there are some things that are known only to the specialist and much that no one knows. But, he continued, the progress of this century has been greater than in all previous time. This period of advancement began with this century and, in emphasizing the semi-barbarous state of the steel industry of 20 years ago, the speaker stated that he then was making Brinell tests with a Riehle tensile machine. This was before Brinell's original paper had appeared in print in America. The electric furnace nowhere was in commercial use; vanadium was at $75 per lb. and the entire available supply was about 10 lb. of contained vanadium. The Taylor-White process was shown to the world at the Paris Exposition of 1900 and modern high-speed steel without vanadium appeared in rapid succession between 1900 and 1905. Metallography and pyrometry as routine research and control methods were struggling for recognition. The trained metallurgist in steel plants was by no means general and their employment by consumers had not yet begun. The war brought about a great demand for chemists, metallurgists and skilled heat treaters for never was the demand for sound material greater, continued the speaker. But the rush for output meant the making of much inferior material and, citing a case of one company which made 1000 tons to deliver 100 tons of billets of not particularly difficult specifications, he said not much progress was made until it was decided to make less steel instead of making it twice. Dr. Mathews called attention to the request printed in tool steel catalogues that buyers tell the use for the steel when ordering. Makers with the experience of 200 years behind them are better qualified to judge of the performance of a steel than is the inexperienced metallurgist. Chemical analyses alone are not sufficient to insure the buyer that he will get what he wants and the speaker further urged that there are many things which cannot be written into specifications which make for quality. The ordinary chemical analysis and static tests, he said, were wholly inadequate as a measure of the service that may be expected and are relatively unimportant details as compared with dynamic test, vibratory, shock, tensile, impact, etc., coupled with microstructure. He concluded by saying that he opposed specifications setting up arbitrary chemical limits, claiming that the best specification was that based upon a mutual understanding between producer and consumer as to the requirements of the latter. The speaker made a plea for more use in a practical way of the advances made in the science of steel.

A. E. White, director department of engineering research, University of Michigan, past national president of the American Society for Steel Treating, introduced G. H. Neilson, president, Braeburn Steel Co. as toastmaster and other speakers were Dr. J. G. Bowman, chancellor University of Pittsburgh, and Prof. F. Crabtree, director department of metallurgical engineering, Carnegie Institute of Technology.

The technical session on the afternoon of May 26, followed a forenoon of inspection of the plant of the Westinghouse Electric & Mfg. Co. where the visitors were tendered a luncheon. A. M. Cox, president and treasurer Pittsburgh Commercial Heat Treating Co., presented a paper on "Abrasive Qualities of Carbon and Alloy Steels;" J. A. Succop, Heppenstall Forge & Knife Co., Pittsburgh, one on "The Importance of Properly Heating and Cooling Steel" and M. A. Grossman, Electric Alloy Steel Co.., Charleroi, Pa., on "Change of Dimensions of High-Speed Steels in Heat Treatment." The latter paper provoked the most active discussion. The speaker claimed that an expansion in dimensions resulted from heat treating. This was quite contrary to the experience of the Halcomb Steel Co., as set forth in a written communication from S. C. Spaulding of that company, who asserted there was no contraction. But Mr. Grossman's views were supported by a speaker who cited the results of Mr. Scott of the Bureau of Standards, and Mr. Grossman answered questions in a fashion as to leave little doubt as to the soundness of his conclusions.

C. M. Johnson, Crucible Steel Co. of America, was chairman of the technical session on May 25, and Prof. H. M. Boylston, department of metallurgy, Case School of Applied Science, Cleveland, acted in the same capacity at the session of May 26.

SPIRAL STEM CASTING

Unusual Electric Steel Casting for Cable Drill Work

TWISTING a long spiral pattern out of a mold is something which ordinarily would not be attempted, but the Sizer Steel Corporation, Buffalo, does this in sections in such a way as to make a long spiral steel casting such as that shown in the illustration. The spiral portion is made in four or five sections of about equal length, each length being some 3 ft. After each pattern has been twisted out of the sand, the several molds are fitted together and the entire casting made in one piece. The gates and risers are located at the parting points between the several mold sections. For the purpose of casting, the axis of the spiral is almost horizontal, there being a slight incline so that the metal flowing into the casting will fill properly. Approximate locations of the partings are shown by broken lines.

These long spiral castings, made of electric steel, are used in drilling oil and gas wells. The only machining required on the spiral wings is on the outside edges, so that the clearance between the diameter of the cylinder represented on the outside of the wings and the inside of the well casing is small and uniform. These spiral wings are designed to keep the rope socket in the center of the hole and to reduce the whipping of the walls with the line. They are so made that material can pass up through them after being ground up by the bit and are said to have proved effective in keeping the bit in a straight course, even though rocks be encountered. This keeps the hole from getting crooked.

These wings are made in a variety of sizes, depending upon needs of the different oil companies using them and the depths to which the wells must be drilled. As shown in the drawing, they are located between the bit and the jars, being securely fastened to each. Their weight is a great aid in drilling the well, while their automatic centering action preserves the pipe from undue wear.

Steel Men's Conference with the Attorney General

WASHINGTON, May 30.—Officials of five independent steel companies which are proposing to consolidate at a conference here last Wednesday with officials of the Department of Justice and the Federal Trade Commission informed the latter that the merger would not be completed until after conclusion by the Government of its investigation into the plan. Similar assurance had been given previously by President Grace of the Bethlehem Steel Corporation and President Downs of the Lackawanna Steel Co., regarding plans for the merger of these two companies. It has been stated that the two branches of the Government ordered by the LaFollette Senate resolution to make the investigation may consolidate the work so that it will be brought under the jurisdiction of one or the other.

In a statement given out regarding the meeting last Wednesday, Attorney General Daugherty said:

"Representation was made that merger of these companies had not been effected and could not be for some time and all of the details of the merger were not available at this time.

"The investigation on the part of the Department of Justice and Federal Trade Commission will be continued and it was agreed that the merger shall not be consummated until the completion of the hearing and investigation."

The steel companies were represented by Chairman John A. Topping, Republic Iron & Steel Co.; Alva C. Dinkey, Milvale Steel & Ordnance Co., and James B. Kennedy, who appeared for the Steel & Tube Co. of America, the Brier Hill Steel Co. and the Inland Steel Co. William Wallace, Jr., appeared as counsel for the steel companies.

Influence of Light and Color in Factories

The research department of the Truscon Laboratory, Detroit, in working out the effective uses of mill white in factory interiors, has also made tests to determine the illumination from gloss and from flat paint surfaces and also some tests in regard to the psychological effect of various colors on individuals. It is found that gloss paint gives slightly less illumination than flat paint, contrary to general belief, the difference being due to the higher percentage of white content in the flat paint, flat wall paint having approximately 70 per cent of pigment, whereas gloss paint usually contains less than 60 per cent. Though a flat paint is very much inclined to collect dust, on the other hand, the light-reflecting properties of a gloss paint often result in a very undesirable glare which produces as much eye strain as insufficient lighting. Work under unfavorable lighting conditions will eventually result in eye strain with various eye diseases.

It is also found that all white ceilings and walls are not good, but that better results can be obtained by the use of a tinted dado of a darker color running to a point about the eye level. This gives relief to the monotonous whiteness of the remainder of the interior. It is also true that shadows are helpful to vision, which brings out the fact that equal light upon all sides of the object is an undesirable arrangement.

The effect of color on individuals has been worked out by A. C. Rapp of Pittsburgh in a bulletin of the Paint Manufacturers' Association. Colors seem to have the following psychological effect:

Black—Melancholia, decreased work.
Red—Temporary stimulation followed by reaction accompanied by nervousness and headaches.
Blue—Calmness and seriousness.
Green—Increased vitality, happiness.
Yellow—Increased vitality, amiability.

It seems apparent that when conditions dictate the use of a colored dado, one should aim to keep away from black and red. Green probably is the best color, since it is the one color to which our eyes by nature are already accustomed. In using green, it may be noted that it is not always necessary to use a dark green, but that some of the very light greens with a high light reflecting value may be used. It is evident that a 100-candle power lamp in a room with dark gray walls and ceiling which absorbs 75 per cent of the light reflects only 25 cp. It is by reflection of light that objects are seen and the best and most accurate work done. Proper reflection and diffusion are accordingly of the utmost importance in increasing light efficiency and in eliminating accidents.

Mahoning Valley Operations

Mahoning Valley independent steel interests are maintaining operations on following average basis: Youngstown Sheet & Tube Co., 85 per cent; Brier Hill Steel Co., 75 per cent; Trumbull Steel Co., 90 per cent; Republic Iron & Steel Co., 65 per cent; Sharon Steel Hoop Co., 80 per cent; Newton Steel Co., Falcon Steel Co. and the Mahoning Valley Steel Co., 100 per cent.

The Girard plant of the A. M. Byers Co., Pittsburgh, is on a 35 per cent basis.

The Republic Iron & Steel Co. is producing skelp on its plate mill. The 84-in. plate mill of the Brier Hill Steel Co. has been consistently active, but the 132-in. unit has been inactive.

The Carnegie Steel Co. is operating its Ohio Works at Youngstown at 90 per cent, and its Union mills and McDonald plant at normal.

Foundry Week at Rochester

Annual Convention of the American Foundrymen's Association June 5 to 9 Provides Program of Exceptional Excellence

WITH a return of prosperous business conditions now apparently assured, foundrymen of the United States will gather at Rochester, N. Y., during the week of June 5 for what should prove to be a highly successful annual convention and exhibition of the American Foundrymen's Association.

In the past two years the activities of the association have been greatly handicapped by the severe business depression. As the turning point

NORMAN VAN VOORHIS

H. G. HETZLER

ALFRED E. HOWELL

Committeemen Who Have Charge of Convention Arrangements

Committees appointed by the Rochester association of foundrymen to have charge of the arrangements for the annual convention of the American Foundrymen's Association are headed by the following chairmen: Executive committee, Norman Van Voorhis, Galusha Stove Works; entertainment, H. G. Hetzler, North West Foundries, Inc.; banquet, W. R. Bean, Alfred E. Howell and J. P. Pero, former presidents of the association; golf, Matthew Elliott, Erie Foundry Co.; hotels, A. H. Jones, American Woodworking Machinery Co.; publicity, Edgar F. Edwards; reception and information, Louis P. Willsea, Willsea Works; finance, Schuyler H. Earl, Gleason Works.

SCHUYLER H. EARL

A. H. JONES

EDGAR F. EDWARDS

MATTHEW ELLIOTT

LOUIS P. WILLSEA

was reached a few months ago it became certain that exhibitors would again be as numerous as during past periods of industrial prosperity, and such expectation has proved true as more than 150 companies, mostly those manufacturing equipment and supplies for the foundry trade, have reserved space for the display of their products.

Profiting by the experiences of the war many manufacturers of foundry equipment have made improvements to old machines or have brought out equipment embodying new ideas and these features will provide the exhibition with an educational interest of exceptional value.

The convention program will, as usual, be divided into several sections devoted to such phases of foundry practice as metallography, brass foundry work, steel founding, aluminum castings, gray iron castings, molding sand research developments, industrial relations and many other subjects.

The international character of the convention, which was introduced at the Columbus meeting in 1920, will be retained this year and the opening session will be devoted to several papers by prominent foundry men of England, France and Belgium.

Great Variety of Products Will Be Shown by Exhibitors

A

ACHESON GRAPHITE CO., Niagara Falls, N. Y. Various sizes of Acheson electrodes used in electric furnaces for metallurgical work of all kinds, also various sizes of welding electrodes; also Acheson foundry facing as well as the cross-section of a joint showing the details of machining necessary in making up electrodes for continuous feed. Represented by Atwood B. Oatman, Fred E. O'Neil, Stanley L. Walworth, sales engineers, and Lyman C. Judson, assistant sales manager.

OGDEN R. ADAMS, Rochester, N. Y. Millholland geared-head turret lathe; Peerless universal shaping saw; Reed-Prentiss geared-head lathe; the new Handy lathes; Syracuse Sander Co.'s band saw and sanders; E. W. Bliss special forming press; Becker vertical milling machine; Sipp drills; Kingsburg drills; Skinner chuck testing machine; Bickford-Swetzer tap and drill grinders; Du-More drills and grinders; Cincinnati shapers; Whitcomb-Blaisdell planer; also Madison cylinder grinder.

AIR REDUCTION SALES CO., New York. Specially designed machines for automatic oxyacetylene welding and cutting, comprising: the radiagraph, for straightline cutting and circle cutting of steel plates and forgings; the oxygraph, for cutting forgings, dies, and shapes; the camograph, for production cutting of hand holes in steam-boiler headers, locomotive links and other parts made in quantity; and a tube-welding machine; also the Airco-Davis-Bournonville hand welding and cutting torches for the welding of gray-iron castings, steel and brass castings, etc., and the cutting of cast iron and steel; also a display of cylinders of Airco oxygen and Airco acetylene, and of the various units of apparatus manufactured by the company under its policy of supplying everything that is needed for the oxyacetylene welding and cutting industry. Represented by Fred E. Rogers, assistant to the apparatus sales manager; New York; H. Hazen, salesman, Buffalo; F. J. Leger, salesman, Buffalo; H. H. Melville, advertising manager, New York.

E. C. ATKINS & CO., Indianapolis, Ind. Saws of all kinds, foundry plates, Kwik-Kut power hack saw machines; metal band saw machines and Cantol wax belt dressing and machine knives. Represented by T. A. Carroll, advertising manager; B. D. Tompson, metal-cutting specialist; W. L. Sturtevant, salesman, and Edward Norvell, metal cutting department.

AMERICAN FOUNDRY EQUIPMENT CO., New York. Sand cutting machine type HP, for small and medium floors; sand cutting machine type AA, a general purpose sand cutting machine; sand cutting machine type K, a new extra heavy duty machine; humane type sand blast rotary table room; gravity type sand blast tumbling barrel; cloth screen type dust arrester; screen hopper type sand blast tank; jolt-rollover-squeeze-pattern draw molding machine; American hammer core machine; corrugated steel flasks; aluminum taper snap flasks; pattern mounts and sundries. Represented by Verne E. Minich, president; Elmer A. Rich, Jr., vice-president and Chicago factory manager; Royer S. Buch, manager York factory; James Rigby, Jr., sales manager; Hutton H. Haley, John Donald Alexander, Charles G. Smith, Jerome E. Sweet, C. B. Schneible, C. D. Steinmeier and E. J. Turnbull, district managers; David Logan, service manager; R. H. Moore, consulting engineer; Philip S. Weiner, assistant sales manager; R. H. Kelley, advertising manager.

AJAX METAL CO., Philadelphia. Display of ingot metals made to the Ajax standard formulae, castings made from such ingots, Ajax bull bearing alloy for babbitting; also a display of a 60 kw. Ajax-Wyatt electric furnace, and a 30 kw. Ajax-Northrup electric furnace. Represented by G. H. Clamer, first vice-president and general manager; W. J. Coane, second vice-president and sales manager; Frank M. Willeson, New England and New York State representative; Zeno D. Barns, Cleveland office; C. F. Hopkins, works manager; Henry Gieseke, William Adams, Dudley Willcox, three latter representing electric furnace department.

ASBURY GRAPHITE MILLS, Asbury, N. J. East India silver lead, Ceylon plumbago, flake graphite and corewash. Represented by H. M. Riddle, senior and junior, and Mr. Adams, New York State representative.

AMERICAN WOODWORKING MACHINERY CO., Rochester, N. Y. Woodworking machines for use in pattern shops, such as lathes, saw benches, planers, sanders, etc.

ARCADE MFG. CO., Freeport, Ill. Hand-operated Modern with operating plates, No. 11 power Modern with operating plates; No. 110 power Modern with operating plates; 6 in. jolter with 8 in. air strip; new type operating 4 in. jolter with hand strip; 8 in. air squeezer, jolt squeezer, piston ring squeezer, post jolt squeezer, core jolters, Brillion pouring devices. Represented by E. H. Morgan, president; L. L. Munn, vice-president and general manager; Henry Tscherning, engineer; Mentor Wheat, August Christen, G. D. Wolfley and R. E. Turnbull, sales department.

ARMSTRONG-BLUM MFG. CO., Chicago. Operating exhibit with a No. 5 Marvel metal band saw running continuously at exceptionally high speed, also, for the first time, Model No. 2 Marvel hack saw equipped with individual motor as a portable outfit supplied with current from the ordinary lamp socket; No. 23 Marvel punch shear and bender and a complete and instructive exhibit of both ordinary and peculiar examples of metal cutting, with a view of suggesting to the practical shop man a great many methods of cutting down shop costs. Represented by Harry J. Blum, secretary, and George J. Blum, vice-president.

AUSTIN CO., Cleveland. Booth decorated with photographs and plans of foundry construction. Represented by O. D. Conover, G. A. Bryant, Jr., C. F. Chard, H. L. Cornelison and H. E. Stitt.

B

BACHARACH INDUSTRIAL INSTRUMENT CO., Pittsburgh. Blast meters, a new instrument which gives a graphic record of both pressure and volume of air delivered on one and the same chart; indicating blast meter, new type pressure indicator (Bi-Fluid) wall type recorder, CO_2 indicator, MG type manometer, MF type manometer. Represented by L. L. Vayda.

BADGER TOOL CO., Beloit, Wis.

BALBACH SMELTING AND REFINING CO., New York. N B C casting copper in ingots and ingot bars; B B B yellow brass ingots; B B B composition ingots; Balbach prime desilverized pig lead; Balbach special antimonial pig lead; B copper sulphate; copper shot; plumber's lead; solder; fine gold in bar form; fine silver in bar form; fine silver in shot form. Represented by F. Schmutzer, secretary; James MacNee, sales department, R. H. Thomas and Thomas Thompson, metallurgists.

C. O. BARTLETT & SNOW CO., Cleveland. Photographs and drawings of mechanical sand handling equipment, continuous molding equipment and mechanical carrying equipment. Represented by H. L. McKinnon, secretary; H. C. Orr, and S. Gertz, engineers.

BASIC MINERAL CO., Pittsburgh. In addition to flux exhibit includes some rare minerals. Represented by E. E. Miller and C. M. Miller.

BASTIAN-BLESSING CO., Chicago. Rego welding and cutting equipment in actual operation. This line consists of all sizes of torches from the torch used for extremely heavy castings down to the small torches for sheet metal and lead welding.

BAUSCH & LOMB OPTICAL CO., Rochester, N. Y.—Metallurgical microscopes and metallographic apparatus.

B. & J. MFG. CO., Springfield, Ohio. V-roll flask guide. Represented by George E. Jackson.

BEARDSLEY-PIPER CO., Chicago. Tractor and turntable type sand throwing molding machines. Represented by E. O. Beardsley and E. L. Mitchell.

BEAUDRY & CO., INC., Boston. A working model of the Beaudry Champion power hammer arranged for motor-drive. Represented by Archibald Parsons, sales manager.

BETHLEHEM STEEL CO., Bethlehem, Pa. Mayari pig iron; castings with Mayari iron added to cupola mixture; transparencies showing mining and reduction operations; pictures of castings made with Mayari iron. Represented by Robert MacDonald, H. B. Kreulen, D. A. Barkley, H. G. Walton and W. R. Shimer.

BINGHAM & TAYLOR, Buffalo, N. Y. A line of high grade electric steel castings for automotive trucks, high pressure fittings and miscellaneous castings for general machinery use. Represented by Clarence D. Taylor, James W. Gibney and William J. Gibney.

S. BIRKENSTEIN & SONS, INC., Chicago. Castings and samples of Wizard brand metals. Represented by George Birkenstein, Charles Rapheal and Matt Schero, Chicago, and Frank McCaul, Philadelphia.

BLACK DIAMOND SAW & MACHINE WORKS, Natick, Mass. Band and circular saw filing and setting machines, brazing outfit, saws and saw guides, flexible shafts and equipment. Represented by Walter B. Ambler, vice-president; P. P. Hubbard, salesman; Clyde W. Blakeslee, sales manager.

BLYSTONE MFG. CO., Cambridge Springs, Pa., No. 1 Blystone sand mixer with power discharge and screen attached, also motor driven.

BONNOT CO., Canton, Ohio. Holbeck pulverized coal system designed for use in malleable iron foundries. Repre-

sented by Stockton Harter, assistant sales manager; E. W. Steele, chief engineer; Charles Longenecker, formerly district manager at Pittsburgh.

C

CARBORUNDUM Co., Niagara Falls, N. Y. Carborundum and Aloxite grinding wheels, Carborundum refractories, Carborundum brand garnet paper and cloth, and Aloxite T. N. F. polishing grain. Represented by W. W. Sanderson, general sales manager; O. C. Dobson, district sales manager, Pittsburgh; S. F. Courter, district sales manager, Philadelphia; C. E. Hawke, J. A. King, H. E. Kerwin, G. R. Rogers and F. C. Guest.

FRANK D. CHASE, INC., Chicago. Plans and photographs for the design, equipping and rehabilitating of foundry plants.

CHICAGO CRUCIBLE Co., Chicago. Graphite crucibles and other products.

CHICAGO PNEUMATIC TOOL Co., New York. Pneumatic hammers, air drills, air grinders, electric drills, electric grinder, air hose couplings, improved sand rammers, improved air hoists, Little Giant drills, Little Giant air grinders, Little Giant combination hoists.

CHARLES J. CLARK BLASTMETER Co., Gladbrook, Iowa. Volume and velocity meters and pressure gages. Represented by B. I. Harms.

CLARK TRUCTRACTOR Co., Buchanan, Mich. A 72 in. wheel base tractor model; a Clark Truklift and in operation outside of the building one hand hoist-end dump body, standard Tructractor. Represented by L. J. Schneider, sales manager; J. W. Taylor, G. M. Chase and W. B. Eldred, district managers.

CLEVELAND CRANE & ENGINEERING Co., Wickliffe, Ohio. A Tramrail crane electrically operated with push-button control, which is applicable for use in foundries in connection with handling molds from the molding machines or molding benches to the floor, and can also be used in connection with the pouring of molds as a "one man" system. Represented by L. E. Salom, F. J. Brittingham, A. F. Anjeskey, D. T. Laylin, H. C. Webb, W. C. Heinle, William G. Wehr, E. T. Bennington, C. C. Robbins, and J. B. Shaver.

CLEVELAND FLUX Co., Cleveland. A complete line of Cornell fluxes, and a new discovery, Bras-Klean. Represented by John C. Cornell, president; Clifford B. Cornell, secretary and treasurer; Loren E. Souers, vice-president; David D. Baxter, New York representative, and Elizabeth C. Weisblat, private secretary.

CLEVELAND PNEUMATIC TOOL Co., Cleveland. Sand rammers, style, floor, bench and core; portable air grinders, bench grinder and lathe grinder, air drills, chipping hammers, sand hammers, riveting hammers, jam riveters, angle gears, holder-on riveters, etc.; also a complete line of hose and pipe fittings, such as seven styles and sizes of Cleco pressure seated air valves in parallel, angle, two-way, three-way and straight-way valves; Bowes air hose couplings in all sizes from ¼ in. to 1½ in. hose and pipe. Represented by H. S. Covey, general sales manager; Arthur Scott, general superintendent; C. D. Garner, Canadian manager; J. T. Graves, Cleveland representative; R. E. Manning, district manager, Pittsburgh.

CLIPPER BELT LACER Co., Grand Rapids, Mich. Entire line of clipper machines, hooks and twisted pins, also a moving belt display. Represented by Carl P. Field, factory representative.

THOMAS E. COALE LUMBER Co., Philadelphia. Special grades of pattern and flask lumber. Represented by S. D. Pettit, New York representative.

COCHRANE-BLY Co., Rochester, N. Y. No. 14 Duplex universal vertical miller and shaper; No. 5 metal sawing machine; No. 11 automatic saw sharpening machine; No. 2 filing machine, all motor driven, in operation.

F. A. COLEMAN, Cleveland. Represented by F. A. Coleman, president and general manager.

COMBINED SUPPLY & EQUIPMENT Co., INC., Buffalo, N. Y. Double angle and angle stem chaplets. Represented by S. LeViness, Jr., and C. L. Jackson, vice-president.

D

DAVENPORT MACHINE & FOUNDRY Co., Davenport, Iowa. Davenport jolt roll-over pattern-draw machine and Davenport jolt stripper machine. Represented by Carl Falk and A. V. Magnuson, salesmen; J. T. Anderson, general manager, and A. D. Ziebarth, engineer.

DAYTON PNEUMATIC TOOL Co., Dayton, Ohio. Complete line of pneumatic riveting and chipping hammers and sand rammers. Represented by George C. Towle, William Gleasner, E. C. Thompson and L. B. George, secretary.

DEBEVOISE-ANDERSON Co., INC., New York. Specimens of pig iron, ore, limestone, coal, coke. Represented by Nils Anderson, C. A. Wyatt, Paul Brooks, Charles Pfeiffer, A. E. Kelly and W. K. Callow.

DOEHLER DIE-CASTING Co., Brooklyn, N. Y. Die-castings of aluminum, zinc, tin and lead alloys as well as "Do-Di" finished brass castings with complete assemblies showing the application. Among new work will be exhibited die-cast ice skates, mechanical rubber molds for balls, dolls, parts for apparatus, radiophone sets, die-cast scissors, etc. Represented by H. H. Doehler, president and general manager; Charles Pack, vice-president and assistant general manager, and C. E. Hart, sales engineer and Rochester representative.

WILLIAM DEMMLER & BROS., Kewanee, Ill. Demmler air-operated core machines in operation. Represented by H. L. and F. A. Demmler.

DETROIT ELECTRIC FURNACE Co., Detroit. A one-ton, type C Detroit electric furnace in operation in the plant of Sarachan & Rosenthal of Rochester; reception booth at exposition. Represented by E. L. Crosby, E. T. Gushee, H. M. St. John and A. E. Rhoads.

HENRY DISSTON & SONS, INC., Philadelphia. Milling saws, hack saw blades, metal band saws, files, tools, etc. One or two machines in operation, on which product will be demonstrated. Represented by Joseph L. Dorrington, L. M. Willard and William Trecht.

JOSEPH DIXON CRUCIBLE Co., Jersey City, N. J.—Numerous styles and sizes of Dixon crucibles, covers, including the standard sizes and shapes, as well as steel melting, reservoir, brazing tilting furnace, crucibles, and retorts, extension tops, muffles, phosphorizers and other refractory products. Represented by J. A. Condit and Messrs. Leonard, Belleville, Shaw, Brinkerhoff and Hewson.

E

ELECTRIC FURNACE Co., Salem, Ohio. Small electric furnace in full operation, melting and pouring red brass, and also a model furnace, showing various features of electric furnace construction; also about 100 pictures of typical installations of these furnaces in various American and foreign foundries. Represented by T. F. Bailey, vice-president; R. F. Benzinger, sales manager; F. J. Peterson, Detroit representative; M. T. Eilis, salesman; R. F. Fletcher, advertising manager.

ELECTRO REFRACTORIES CORPORATION, Buffalo, N. Y. Tercod crucible. Represented by C. A. Asher, Eastern representative; W. E. Howard, Western representative.

F

FEDERAL MALLEABLE Co., West Allis, Wis. Rapid molding machines and rapid squeezer stripper in operation; also improvements on old types of machines. Represented by L. C. Wilson, secretary, K. H. Siemens and W. J. MacNeill.

FOUNDRY EQUIPMENT Co., Cleveland. Large photographs of installations of Coleman core and mold ovens illustrating portable rack, rolling drawer, car and special types of ovens; also installations of Coleman brass and aluminum melting furnaces. Represented by C. A. Barnett, M. A. Beltaire, Jr., and S. D. Rickard.

G

GENERAL ELECTRIC Co., Schenectady, N. Y. One 50 lb. crucible metal melting furnace, with automatic control and transformer, and one portable semi-automatic arc welding equipment operated by a 200 ampere portable motor generator set with the necessary starting and control panel. Both will be in operation.

GLOBE IRON CRUSH & SHOT Co., Mansfield, Ohio. Globe high-carbon chilled shot, together with sample castings showing results obtained by the use of this material in the sand blast machine in place of sand.

ROBERT GORDON, INC., Chicago. Quarter-size working model of mechanical hot-blast heater in operation. Represented by T. H. Monaghan, president; A. L. Weizel, sales manager; J. L. Zimmerman, manager Cleveland office, and R. M. Zimmerman, manager New York office.

GRIMES MOLDING MACHINE Co., Detroit. Hand-rammed roll-over molding machine and a 2500-lb. capacity jar-ram rollover molding machine. Represented by George L. Grimes and Charles J. Skeffington.

H

HANNA ENGINEERING WORKS, Chicago. A 6 in. diameter cylinder Mumford air-jolt machine and a standard cylinder type of Pendant air hoist.

CLEMENT A. HARDY Co., Chicago, Ill. Exhibit solely of photographs and blue-prints.

R. G. HASKINS Co., Chicago, Ill. Flexible shaft grinding equipment and die filing machine. Represented by R. G. Haskins.

HAYWARD Co., New York. Bridge supporting hoists handling one Hayward 7½ cu. ft. electric motor bucket and air-operated Hayward orange-peel bucket; models, literature, etc. Represented by H. M. Davison, sales manager; H. S. Atkinson, engineer; C. S. Sargent, salesman; P. M. Armstrong, engineer.

HERMAN PNEUMATIC MACHINE Co. Small working model of large type jar independent rollover and pattern drawing machine. Represented by R. F. Ringle, works engineer; I. J. Oesterling, chief engineer; R. P. Morgan, C. W. Miller, Robert M. Porteous, C. S. McMath and W. W. Hughes, service department; Thomas Kaveny, president; A. G. Doyle, vice-president; R. Harris, secretary.

HIGH SPEED HAMMER Co., Rochester, N. Y. Different sizes of High Speed riveting hammers, also Model E-50 High Speed ball bearing motor-driven sensitive bench drill press, Bruno slotting attachment for shapers and planers; No. 6-B High Speed riveting hammer, giving demonstrations of heading rivets ⅞ in. in diameter cold.

HILL & GRIFFITHS, Cincinnati. Reception booth with John Hill, William Oberhelman, Bruce Hill, and C. L. Gysin in attendance.

HOEVEL MFG. CORPORATION, Jersey City, N. J. Rotary table, revolving barrel sandblast machine and individual sand tanks, pressure pattern of Hoevel and injector types. Represented by James M. Batton, L. B. Passmore and F. Welte.

HOLCROFT & Co., Detroit. Photographs and literature. Represented by Mr. H. L. Ritts, sales manager, and C. T. Holcroft, president.

HYATT ROLLER BEARING Co., New York. A complete line of bearings for cranes, trolleys, hoists, trucks, conveyors, sand mixing machinery, machine tools, cars, power transmission lines and other foundry equipment; an electrically operated model showing a Hyatt bearing enclosed in glass, thus giving a visual demonstration of the positive oiling action of these bearings. Represented by D. Gleisen, manager industrial bearings division; W. B. Wachtler, directing engineer general applications department; John F. McGuinness, directing engineer Transmission department; F. H. Knight, New York district engineer.

I

INDEPENDENT PNEUMATIC TOOL Co., Chicago. Pneumatic and electric tools for foundry use; also latest developments and inventions in the tool line for foundry purposes. Represented by R. T. Scott, vice-president, New York; H. G. Keller, New York; F. H. Charbono, Philadelphia; F. J. Passino, Pittsburgh; S. W. Lanham, Columbus, Ohio; H. F. White, Cleveland, and A. Anderson, sales engineer, Chicago.

INDUSTRIAL CONTROLLER Co., Milwaukee. Hand-operated and automatic compensators and automatic starters, also remote control starters for direct current. Represented by Messrs. J. H. Burroughs, manager of Buffalo office, and R. G. Kellogg sales manager.

INGERSOLL-RAND CO., New York. Imperial Type XRB-2 stage 11 x 7 x 10 in. stroke air compressor with short belt drive for Westinghouse motor—a 100 lb. pressure machine with 300 cu. ft. capacity; also little David pneumatic tools, including sand rammers, portable pneumatic grinders, air-driven wire brushes for cleaning castings, chipping hammers, air-motor hoists, air drills and riveting hammers.

INTERNATIONAL MOLDING MACHINE CO., Chicago. Combination power turn-over machines; combination jolt stripping machines; hand turn-over machines; special machines for core work. Represented by Edward A. Pridmore, president; F. W. Hamel, sales department; E. G. Borgnis, sales department.

K

SPENCER KELLOGG & SONS, INC., Buffalo, N. Y. Core oils. Represented by W. L. Goetz, manager core oil department, assisted by J. N. Yeager, E. G. Allen, G. B. Chase, M. B. Nordlie.

KUEHNLE CO., INC., Philadelphia. Various types of cores, samples of core oils and literature describing them. Represented by C. Albert Kuehnle, president; James A. Burk, representative, and E. M. Satterthwaite, director of sales.

L

H. M. LANE CO., Detroit. Photographs and drawings of industrial plants. Represented by H. M. Lane, A. O. Thomas and G. Pitt.

LAVA CRUCIBLE CO., Pittsburgh. Lava melting crucible, Lavapatch super refractory high temperature furnace cement, Lavaflux metal flux. Represented by P. L. Berkey, president and general manager; F. South, Jr., sales manager; D. E. MacLean and A. J. Gloekler, salesmen.

LEEDS & NORTHRUP CO., Philadelphia. Potentiometer Pyrometers, indicating and recording types, including two-couple hot and cold-zone temperature recorder. Represented by O. Brewer and E. B. Estabrook.

LINK-BELT CO., Chicago. Rapp revivifier for molding sand, electric hoist and a number of enlarged pictures showing installations of molding sand handling and preparing machinery. Represented by A. G. J. Rapp, Chicago, and Howard MacNeal, Philadelphia; W. C. Carter, production manager, Chicago; George O'Connor, foundry superintendent, Chicago; George L. Morehead, manager, Indianapolis; Henry L. Waterbury, foundry superintendent, Indianapolis; E. F. Mullin, engineer, Philadelphia; S. L. Haines, manager merchandise sales, Philadelphia.

DAVID LUPTON'S SONS CO., Philadelphia. Lupton pivoted sash, counterbalanced sash, double-hung windows, Pond continuous sash and operating device and cross sections of Pond roof design for the proper ventilation of foundries and buildings for heat-producing processes. Represented by Clarke P. Pond, vice-president and sales manager; and C. F. P. Buckwalter, assistant sales manager.

M

MACLEOD CO., Cincinnati. Sand-blast tumbling barrels; a sand-blast machine and oil burning equipment. Represented by James Lauder and Alfred Anderson.

J. S. MCCORMICK CO., Pittsburgh. Vulcan blacking, Ajax blacking, Lion binder, chaplets of a new type, foundry equipment of all kinds. Represented by J. S. McCormick, president; T. E. Malone, secretary; S. R. Costley, and E. M. Lewis, representatives.

MALLEABLE IRON FITTINGS CO., Branford, Conn. New Branford vibrator riddle; also a new line of accessories in addition to the regular Branford line. Represented by G. B. Pickop, assistant superintendent, and one of the factory foremen.

MECHANICAL APPLIANCE CO., Milwaukee. Ball bearing motors; also a number of motors direct connected to machines of other exhibitors of foundry equipment. Represented by W. B. Crabtree, factory commercial engineer.

MENEFEE FOUNDRY CO., Fort Wayne, Ind. Demonstration of the making of pattern mounts from Menco. Represented by J. W. Menefee, secretary, and Earl H. Menefee, manager.

METAL THERMIT CORPORATION, New York. Metals and alloys produced by the Thermit process; also samples and pictures of Thermit welding. Represented by Arthur F. Braid, sales manager, metals and alloys department, and J. M. Wilson, representative.

MICHIGAN SMELTING & REFINING CO., Detroit. Brass and bronze ingots, castings made from each grade, babbitt metals, solders and white metal castings. Special emphasis on their high tensile bronzes, such as manganese and especially company's Apex bronze. Represented by John R. Searles, Norman Sillman, Henry Levitt, B. P. Cooke, C. L. Hall, J. P. Tiernan, R. R. Arnold.

MILLS, RHINES, BELLMAN & NORDHOFF, Toledo, Ohio. Blueprints of several recently constructed foundries, forge shops and machine shops; albums of photographs showing the completed buildings together with large illustrations of plants and types of buildings to be used and complete estimated data for approximate costs of new buildings at to-day's prices. Represented by George S. Mills, George V. Rhines, John Gillett and Morris Hobbs.

MODERN POURING DEVICE CO., Pt. Washington, Wis.

MOLINE IRON WORKS, Moline, Ill. Molding machines. Represented by B. V. Nutt.

MONARCH ENGINEERING & MFG. CO., Baltimore. No. 125 special tilting, combustion chamber, crucible furnace, open flame, Hall type incandescent oil burner; Foundry cupola, coke, combination stationary and tilting, capacity one ton, motor blower; Foundry cupola, coke, tilting, capacity 300 lb.; Blizzard universal sand mixer; pre-heated air No. 80 stationary crucible furnace, combination oil and gas; Stationary crucible furnace No. 80, combination oil and gas; Tilting crucible furnace No. 125, oil or gas, with motor blower; double chamber furnace without crucibles, No. 1, oil or gas; Simplex single chamber furnace, without crucibles, No. 92, oil or gas; motor driven continuous revolving furnace, 500 lb. capacity, without crucibles; combination core oven, oil or gas; core oven, coke; stationary soft metal furnace, combination oil and gas; tilting iron pot furnace for aluminum; Monometers soft metal furnace, automatic control; oil pump, positive-pressure blower; motor blower; double pre-heated air-shell tilting crucible coke furnace, No. 80; hardening and annealing furnace; combination 8 in 1 annealing furnace; ladle heater combination; portable heater. Represented by Frank Maujean, James V. Martin, Lees Hall, William Raber, I. D. Adams and H. D. Harvey.

N

NATIONAL ENGINEERING CO., Chicago. No. 2 Simpson sand mixer with 6 ft. diameter pan; No. 1 Simpson sand mixer with 4 ft. diameter pan, and No. 0 size Simpson sand mixer with 3 ft. diameter pan. Represented by H. S. Simpson, president; S. H. Cleland, Eastern sales manager; Barney Castor, master mechanic; Charles J. Skeffington, Detroit representative, and Alexander Haigh.

WILLIAM H. NICHOLLS CO., INC., Brooklyn. Several types of foundry machines, including 12-36 type D, portable duplex, jolt, squeeze and draw; 14-42 combination type B. & E. portable duplex, jolt, squeeze and electric draw; 18-44 type D, jolt, squeeze and draw; 18-44 type D, special jolt, squeeze and draw; 12-36 type D, jolt, squeeze and draw; 12-36 type E, jolt, squeeze and electric draw; 10-32 type E, jolt, squeeze and electric draw; 1-32 type D, jolt, squeeze and draw; 10-32 type B, jolt and squeeze; 10-32 type D, jolt, squeeze and draw.

THE NORMA COMPANY OF AMERICA, New York. Norma precision ball bearings; Hoffmann roller bearings and ball thrust bearings. Represented by F. W. Mesinger and R. E. Hecker.

NORTHERN BLOWER CO., Cleveland. Small emery stands with piping; small dust arrester and sand blast room in miniature. Represented by M. A. Eiben and E. J. Moore.

O

S. OBERMAYER CO., Chicago. Hott Patch cements, Peerless parting and vibrators. Represented by Theodore Kauffmann, president; S. T. Johnston, vice-president; E. D. Frohman, vice-president; H. D. Barker; J. L. Cummings, H. E. Beckman, J. E. Evans, William Lawson and W. C. Samuels, representatives.

OHIO BODY & BLOWER CO., Cleveland, Ohio. Standard portable coke oven for core baking and one rack type oven in connection with a rack and elevating truck. Represented by W. E. Clement, secretary; E. N. Averhill, district representative, and C. F. Mayer, oven department.

GEORGE OLDHAM & SON CO., Baltimore, Md. In operation, full line of pneumatic equipment which consists of chipping hammers, foundry hammers, scalers and riveting hammers. Represented by H. J. Bannister, R. W. Nelson, J. T. Biles, and P. Woolfolk.

OSBORN MFG. CO., Cleveland. Roll-over jolt machines with electrically operated roll-over and pattern draw; electrically operated flask filling machine, handling sand into the flask, jolt squeezer machines, plain air squeezer machines, combination jolt stripper squeezer machines, hand operated roll-over machines and hand operated stripper machines. Represented by Franklin G. Smith, president; H. R. Atwater, vice-president and sales manager, machine division; E. S. Carman, secretary and chief engineer; E. T. Doddridge, sales engineer; J. C. Alberts, sales engineer; R. E. Kiefer, F. T. Spikerman, H. E. Deakins, M. R. Atwater, sales engineers.

OXWELD ACETYLENE CO., Newark, N. J. Oxweld low-pressure duplex type acetylene generator; a 20-cylinder oxygen manifold; welding and cutting outfits and supplies, also a demonstration of the application of welding and cutting equipment to the class of work usually met with in the foundry. Represented by J. N. Walker, Eastern department sales manager; L. D. Burnett, assistant to department sales manager; Mark Wade, senior sales engineer; G. R. Mitchell, senior sales engineer; A. E. Dittrich, service operator.

P

PANGBORN CORPORATION, Hagerstown, Md. Representative line of sand-blast equipment, both still and in operation, including new barrel sand-blast, cabinet sand-blast, Hygienic cabinet table sand-blast, new model sand-blast room, hose machine, portable sand-blast, and a new type dust arrester (cloth screen) with photographs of actual installation of various types. Represented by Thomas W. Pangborn, president; John C. Pangborn, vice-president; J. P. Potter, works manager; F. J. Hull, mechanical engineer; George A. Cooley, district sales engineer; Jesse J. Bowen, district sales engineer; Roy C. Koch, district sales engineer; Charles T. Bird, district sales engineer; W. C. Lytle, district sales engineer; H. D. Gates, sales manager.

J. W. PAXSON CO., Philadelphia. Foundry supplies. Represented by H. M. Bougher, I. F. Kremer, J. F. Gaehring, C. B. Somers, H. F. Hoevel.

CHARLES PETTINOS, New York. Graphite, plumbago, foundry facings and blackings, and also molding and foundry sands of all kinds. Represented by Marshall Housekeeper and J. H. Bing, sales representatives.

GEORGE F. PETTINOS, Philadelphia. Representative samples of various kinds and grades of molding sands and gravel, foundry facings and blackings, lubricating graphites, and molybdenum shovels. Represented by H. B Taylor, Jr., sales manager, Philadelphia; James H. Hatten, salesman, Philadelphia; H. I. Graves, salesman, Schenectady, N. Y.; Alexander Haigh, Boston.

PICKANDS, BROWN & CO., Chicago. Solvay foundry coke. Represented by G. A. T. Long, R. S. Dutton, manager of sales, and F. L. Schulze, assistant sales agent.

PITTSBURGH ELECTRIC FURNACE CORPORATION, Pittsburgh. Pictures of the Lectromelt furnace and literature, also samples of castings which have been made in the furnace. Represented by Messrs. Wallis and Cawthon.

PORCELAIN ENAMEL & MFG. CO., Baltimore, Md. Miniature porcelain enameling equipment, porcelain enameling cast iron, in operation. Represented by Heinrich Turk, president; Karl Turk, vice-president; Frank G. Roberts, service engineer.

PORTAGE SILICA CO., Youngstown, Ohio. Conglomerate silica rock in its natural state, various grades of sand blast, steel molding and core sands. Represented by E. E. Kloos, C. F. Eberhart, L. R. Farrell.

HENRY E. PRIDMORE, Chicago Ill. 26-10-in. draw combination electric jolt power rock-over drop machine with patterns mounted; 16 x 20-8 in. draw combination electric jolt strip machine with patterns mounted; two 10 x 12-in. square

stand machines with M. C. B. brake shoe patterns mounted; 16 x 4-5-in. drop rock-over drop machine with patterns mounted. Represented by Mrs. Henry E. Pridmore, and Henry A. Pridmore, Marshall E. Pridmore, D. F. Eagan, C. H. Ellis, Henry G. Schlichter.

R

RACINE TOOL & MACHINE CO., Racine, Wis. Racine high speed metal cutting machines, and demonstrations of metal cutting; Racine junior machine motor driven; also the Racine automatic broach slotter and keyseater. Represented by M. F. Erskine, president; William Reinhardt, superintendent; Thomas A. Hyde, Eastern representative.

RICHARDS-WILCOX MFG. CO., Aurora, Ill. Over-Way conveying equipment, both trolley and I-beam types of track, including tongue and stub switches, two-way and three-way; ball bearing Whale I-beam trolleys, ball bearing traveling crane, hoists, etc. Represented by W. H. Fitch, A. J. Eggleston, E. J. G. Phillips, R. F. Murphy, H. R. Butler and W. O'Brien.

ROGERS, BROWN & CO., Cincinnati. Set-up of a large electrically-operated map, showing the location of blast furnaces, coke ovens, iron ore, and fluorspar mines, as well as the location of other points from which various commodities are shipped. Represented by R. W. Clark, New York; George R. Sullivan, Philadelphia; H. W. Fernald, Boston; Thomas A. Wilson, Pittsburgh; Harwood Wilson, Cleveland; A. F. Stengel, Buffalo; W. R. Maher, Buffalo; F. W. Bauer, Cincinnati; J. R. Morehead, Cincinnati.

P. H. & F. M. ROOTS CO., Chicago. Roots foundry cupola charging hoist; a moving model explaining the operation of the Roots rotary positive blower; a foundry blower; several small blowers used for forges, brass furnaces, etc., and the Roots foundry flask guide. Represented by H. M. Papworth, New York manager; William Morgan, manager of foundry specialties department at Connersville; D. R. Schively, Connersville, and Mr. Snyder, New York territory.

ROYER FOUNDRY & MACHINE CO., Wilkes-Barre, Pa. Working model of sand airifier, separator and blender, combined in one machine, together with a smaller model built with glass hoppers to show the new principle of combing sand in separate grains, separating the foreign material from same, and discharging it from the machine in a manner which thoroughly airifies every particle of the treated sand. Represented by G. F. Royer, president, and W. M. Williams, secretary-treasurer.

S

SABIN MACHINE CO., Cleveland. Sabin one-man factory trucks, particularly the type S for steel factory barrels; also steel factory barrels.

SAFETY EQUIPMENT SERVICE CO., Cleveland. Complete line of safety appliances and supplies including industrial goggles for chippers and grinders, welders, and all industrial users; safety clothing, gloves, leggings and helmets made from asbestos; waterproofed, fireproofed and rubber materials; sand-blast helmets, dust hoods, gas masks, respirators, first-aid equipment and supplies, specialties required by welders and many other safety supplies required in the foundry and mill. Represented by H. L. Wood and B. W. Nutt.

SHEPARD ELECTRIC CRANE & HOIST CO., Montour Falls, N. Y. One of each type of Liftabout, which will be mounted on two I-beams each about 15 ft. long, in full operation. Represented by R. H. McGredy, sales manager, F. A. Hatch, general manager; G. L. Drake, J. E. LaTourrette and H. H. Hickman.

SIMONDS MFG. CO., Fitchburg, Mass. Circular metal saws, hack-saw blades and files. An inserted-tooth metal-cutting-off saw in action on a machine cutting steel bars. Represented by H. B. McDonald and H. A. Schulte.

SKINNER BROS. MFG. CO., St. Louis. Baetz patent air heaters of medium capacity and direct-fired heater in a popular size. Represented by E. V. D. Wallace, Buffalo manager.

THE W. W. SLY MFG. CO., Cleveland. A complete sand blast room installation, including the room proper, pressure tank, sand elevator and dust arrester; a No. 4 tilted sand blast mill, adapted for sand blasting small forgings, gray iron parts and brass work; a 4 x 7 ft. sand blast cabinet for use in cleaning flat work and work not adapted for a barrel; a 30/40 horizontal sand blast mill for use in steel foundries and gray iron foundries having somewhat of a volume of production; a 5 x 7 ft. steel core oven, made of steel asbestos insulated panels; a table of model tumbling mills, toy size, illustrating the drive, bearings and general construction. Represented by S. C. Vessy, president; F. W. Klatt, general manager; F. A. Ebeling, sales manager; D. L. Harris, assistant sales manager; C. P. Guion, Western representative; D. P. Carter, Eastern representative; J. L. Battenfeld, Central representative; J. W. Dopp, Michigan representative; H. J. Felsburg, Pennsylvania representative; J. D. Turner, Alabama and Georgia representative; M. A. Schnaedelbach, St. Louis representative; R. W. Hasselle, Tennessee representative, and representatives from Canadian connection.

WERNER G. SMITH CO., Cleveland. Samples of core oils and specimen cores made by prominent foundries; also specimen castings. Represented by Werner G. Smith, president; Milton S. Finley, vice-president; Frank H. Grace, sales manager; Frank H. Dodge, Detroit manager; L. P. Robinson, Boston manager; William E. Rayel, special representative; E. H. Heartlein, repersentative; Louis F. Ferster, advertising manager.

SPENCER TURBINE CO., Hartford, Conn. Spencer turbo-compressors as used for blowing gray iron cupolas, also smaller sizes used in connection with oil and gas burning brass-melting furnaces. Represented by S. E. Phillips, secretary; H. M. Grossman, sales engineer; and Willard G. Gross, Western New York manager.

STERLING WHEELBARROW CO., Milwaukee. Foundry flasks, wheelbarrows and a complete line of foundry specialties; also a wheel testing machine. Represented by J. M. Dickson, Cleveland; J. J. Coyne, Chicago; H. J. Felsburg, Philadelphia; George H. Lambkin and W. L. Washer, New York.

W. F. STODDER, Syracuse, N. Y. Cyclone suction sand blast, three-in-one sand blast cleaning table, oil burners. Represented by W. F. Stodder.

SULLIVAN MACHINERY CO., Chicago. A 400-ft. angle-compound air compressor in operation to drive other exhibits at 80 lb. air pressure; Sullivan utility air forge hammer in operation, and two sizes of Sullivan core breakers; A Sullivan WG-6 single-stage belt-driven compressor, size 10 x 10, together with the wafer plate valve and other construction features employed in these machines. Represented by Chester G. Cummings, sales representative; Alden L. Covill, Rochester representative, and Alex Milne, in charge of the exhibit.

SUPERARC WELDING MACHINE CO., Detroit.

SYRACUSE SUPPLY CO,, Syracuse, N. Y. Machine tools manufactured by the American Tool Works Co., Cincinnati, Kearney & Trecker Co., Milwaukee, Edlund Machinery Co., Cortland, N. Y.; together with several other items of machine shop equipment. Machine-tool equipment equipped with individual motor drives. Represented by expert operators from each of the factories, together with sales forces.

T

TABOR MFG. CO., Philadelphia. Complete line of molding machines, including squeezers, jar squeezers, jar strippers, split pattern machines and jar rollovers. Represented by Wilfred Lewis, president; H. W. Brown, secretary; J. T. Ramsden, chief engineer; also following salesmen: H. W. Impey, Boston; John Fendner, Philadelphia; E. S. Lewis, Pittsburgh; W. E. Sewell, Cincinnati; J. H. Coleman, Cleveland; T. L. Sumner, Philadelphia; P. J. Shire, Philadelphia.

TAYLOR INSTRUMENT COMPANIES, Rochester, N. Y. A complete line of electrical pyrometers for foundry work, also recording and indicating thermometers for core ovens. Represented by H. B. Brown, G. A. Howell, A. A. Sandy, J. J. Kimmel, C. B. Carbon and J. W. Schwarz.

TRUSCON STEEL CO., Youngstown, Ohio. Truscon steel foundry flasks, core trays, core boxes, core plates, snap flask bands, snap flask mold jackets, bottom boards, steel platforms and boxes for left trucks. Represented by G. F. Sparks, general manager pressed steel department; J. C. Peirce, Chicago, representative; C. E. Shedeker, New York City representative; F. F. Griswold, Cleveland representative; H. W. Jencks, Detroit representative; G. E. Madden, Pittsburgh representative; J. A. Morrissey, Buffalo representative; N. C. Ferreri, Youngstown sales representative; W. B. Jones, Jr., Youngstown, Ohio, representative; P. A. Nuttall, Youngstown, Ohio, service department.

U

UNITED COMPOUND CO., Buffalo, N. Y. Samples of Buffalo brand vent wax, Buffalo brand pattern wax and Buffalo corrugated gaggers. Represented by W. F. Bradley and L. F. Leney.

UNITED STATES SILICA CO., Chicago. Flint shot sand blast abrasive, flint silica steel molding sand, flint silica, core sand and literature describing same; castings, forgings, etc.

UNITED STATES GRAPHITE CO., Saginaw, Mich. Plumbagos and foundry facings ground from pure natural amorphous graphite from its mines in Mexico; also other products, such as grease, carbon brushes. Represented by G. D. Robinson, R. J. Edmiston and C. D. McIntosh.

V

VIBRATING MACHINERY CO., INC., Chicago. Sandhog model 1922; twin-Sandhog with automatic discharge of tailings; clay-hog used for screening clay milk and colors. Represented by Julius Schroeter, president; Arthur Piepjohn, master mechanic, and William Lindsay, chief electrician.

W

WADSWORTH CORE MACHINE & EQUIPMENT CO., Akron, Ohio. Wadsworth No. 3 core-making machine, capacity ⅜ to 7 in.; Wadsworth No. 1 core-making machine, capacity ⅜ to 3 in.; Wadsworth 1½-in. cutting-off and coning machine, capacity ½ to 4 in.; various sizes of the Wadsworth Never-Break all-steel core plates and bottom plates.

WADSWORTH SAND CUTTER CORPORATION. Moving picture views of its sand cutting machinery in operation. Represented by H. L. Wadsworth, H. B. Fay and K. F. Barrow.

J. D. WALLACE & CO., Chicago. Portable bench tools for use in pattern shops and foundries; a new 16-in. band saw and new drives of the splash lubrication type; a new automatically controlled glue pot. Represented by Mr. Wallace; H. L. Ramsey, sales manager; C. J. Rennie Boston manager; A. N. Frecker, New York manager; William Uhlhorn, Baltimore manager; C. E. Ward, Buffalo; A. M. Anderson, Pittsburgh.

WAYNE OIL TANK & PUMP CO., Fort Wayne, Ind. Stationary, pit-type crucible melting furnace with air pre-heater, a ladle heater, portable wheel tank for core oil, automatic interlocking fuel cutoff valve and high and low pressure oil and gas burners. Represented by R. P. Maynard.

WESTINGHOUSE ELECTRIC & MFG. CO., East Pittsburgh, Pa. Foundry and machine shop equipment and supplies such as a 175 ampere portable arc welding set in operation and industrial automatic controllers of both the alternating current and direct current types showing the interchangeability of parts; also industrial motors in operation. Represented by W. W. Reddie, manager of the metal-working section industrial department of the Westinghouse company, chief official representative of the company. Other representatives will be A. M. Candy, welding engineer; Paul Orr, welding demonstrator, F. D. Egan, general engineer, and A. M. Turner, publicity representative.

WESTINGHOUSE TRACTION BRAKE CO., Pittsburgh. Westinghouse National type 3VS-24, 335 cubic foot piston displacement motor driven air compressor driven from a 60-horsepower, 3-phase, 60-cycle, 220-volt, a.c. motor through herringbone gear and pinion, including latest type HP control, automatic water control valve, all mounted on common bed plate, making complete self-contained unit; also Westinghouse 42½ x 96-in. main reservoir enameled inside and out, designed for a working pressure of 140 lb. per sq. in., including drain cock, 5-in. single-pointer air gage, safety valve, etc.; also several types of air-operating valves, standard air cutout cocks,

½-in. air hose with fittings, etc. Represented by M. H. Burchard, representative, Chicago; O. H. Miller, industrial representative, New York; J. F. Ames, mechanical expert, New York; F. S. Young, industrial representative, Pittsburgh; S. A. King, industrial representative, Pittsburgh.

WHITE & BRO., Philadelphia. Certificate metals in their entirety, comprising composition and yellow ingot brass, Marine brand manganese bronze, C. C. brand of casting copper and white metals. Represented by G. Horace Krider, L. D. Kluver, Raymond Hunter, Harold Reinhardt, C. B. White and Frank Krug.

WHITEHEAD BROTHERS CO., Buffalo, N. Y. Booth fitted up as a reception room; samples of molding sand and castings. Represented by A. J. Miller, J. H. Whitehead, V. L. Whitehead, Jr., R. L. Cleland, A. W. Jacus, C. E. Andrews, R. L. Carpenter, A. Y. Gregory.

WHITING CORPORATION, Harvey, Ill. Sand-cutting and screening machine; crane ladle with helical worm gearing, also a set of helical worm gearing with a section cut away to show the interior construction; tumbling barrel parts; vertical air hoist; model of crane trolley, together with photographs, drawings, catalogs, etc. Represented by J. H. Whiting, president and treasurer; T. S. Hammond, secretary; R. H. Bourne, vice-president and sales manager; R. E. Prussing, sales engineer; J. S. Townsend, mechanical engineer; G. P. Fisher, metallurgist; A. W. Gregg, foundry superintendent; C. H. Erickson and W. A. Goebel of service department.

T. B. WOOD'S SONS CO., Chambersburg, Pa. Equipment for the Wood system of taper snap molding, comprising the Peerless patented tapered snap flask and automatic adjustable patented snap jacket; flasks and jackets to be shown in various sizes adapted for a wide range of snap work. Represented by C. M. Wood and Victor Leisher.

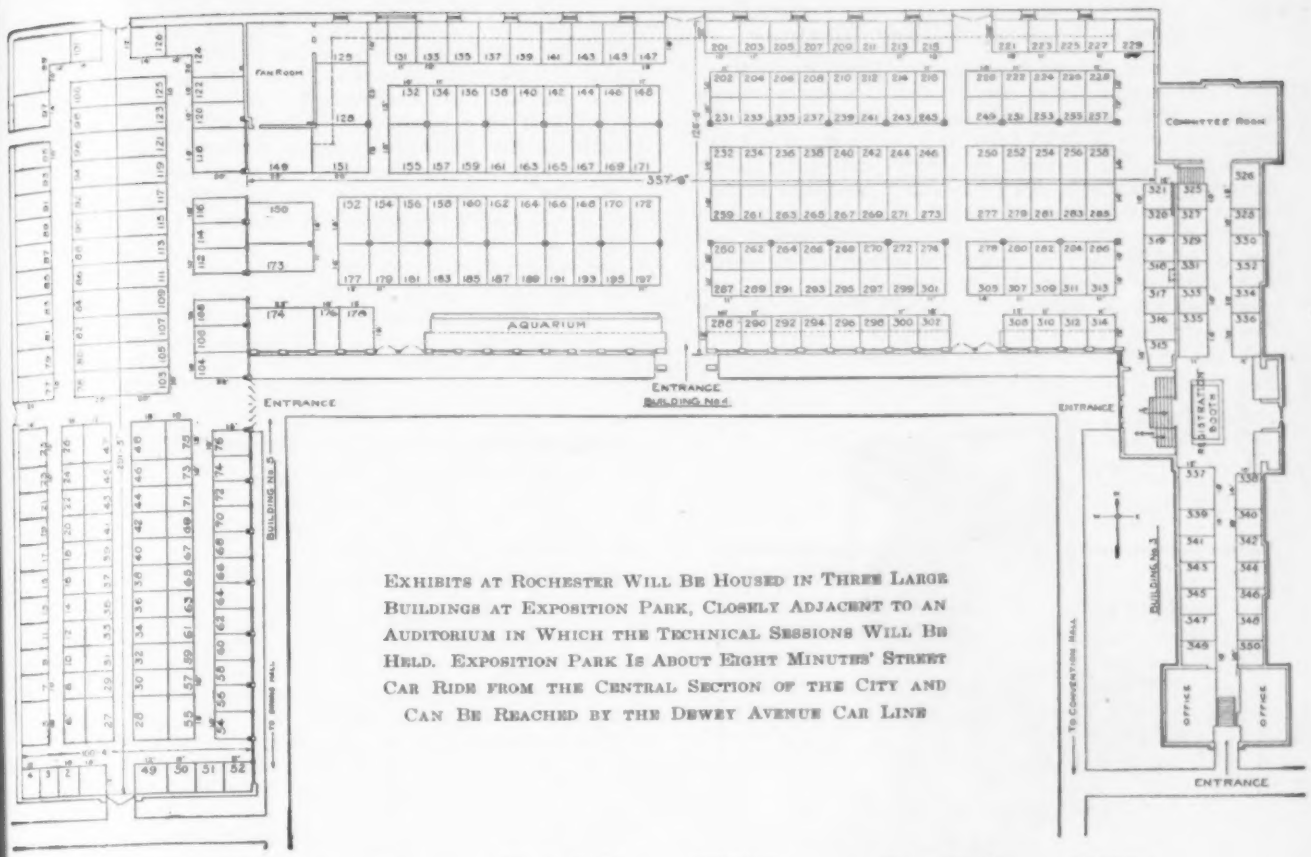
E. J. WOODISON, Detroit. Core and molding machines, foundry supplies, platers' and polishers' supplies. Represented by E. J. Woodison, president; C. H. Woodison, vice-president; J. C. Woodison, secretary; G. A. Herman, manager core oil department; A. W. Ferguson, sales manager; A. F. Jordan, Boston manager; M. A. Bell, St. Louis manager; H. Z. Dingee, Philadelphia manager; C. F. Witters, Milwaukee manager; R. S. Hoffman, Cleveland manager; Mr. Wark, Buffalo manager, and the following salesmen: E. A. Mead, J. A. Carpenter, R. A. Burritt, W. W. Wright, F. F. Shortsleeves, George H. Donoghue, C. D. Pinkerton, H. T. Taylor, Ray Higgins, W. W. Bowring, George Quinn, E. C. Schafer, William Muir, William Maybank, J. J. Jerosky.

Y

YOUNG BROTHERS CO., Detroit. Insulated steel panel oven, 8 x 7 x 7 ft., designed for heating by gas, oil, or coke; a small testing or laboratory oven, electrically heated and oven accessories. Represented by G. A. Young, R. B. Reed, T. P. McVicker, V. A. Fox, J. E. Randall, E. P. Oates.

Location of Exhibits at Foundrymen's Convention

No. of Booth	Exhibitor
	A
232, 234, 259, 261	*Abrasive Industry*
265	Acheson Graphite Co.
91, 93, 95	Air Reduction Sales Co.
308, 310, 312, 314	Ajax Metal Co.
19	Allan Mfg. & Welding Co.
20, 22, 24, 26, 39, 41, 43, 45 47	American Foundry Equipment Co.
195	American Woodworking Machinery Co.
103, 105, 107	Arcade Mfg. Co.
165	Armstrong-Blum Mfg. Co.
251	Asbury Graphite Mills
162, 164	E. C. Atkins & Co.
300	Austin Co.
	B
68	B. & J. Mfg. Co.
290	Bacharach Industrial Instrument Co.
329, 331	Balbach Smelting & Refining Co.
132	Badger Tool Co.
160	C. O. Bartlett & Snow Co.
242	Basic Mineral Co.
50 and 51	Bastian-Blessing Co.
268, 270	Bausch & Lomb Optical Co.
97, 99, 100	Beardsley-Piper Co.
257	Beaudry & Co., Inc.
179, 181	Bethlehem Steel Co.
340	S. Birkenstein & Sons, Inc.
243	Black Diamond Saw & Machine Wks.
193	Blystone Mfg. Co.
244	Bonnot Co.
286	Brass World Publishing Co.
	C
150	Carborundum Co.
271, 273	Frank D. Chase, Inc.
317	Chicago Crucible Co.
124, 126	Chicago Pneumatic Tool Co.
328	Chas. J. Clark Blastmeter Co.
28, 30	Clark Tructractor Co.
176, 178	Cleveland Crane & Engineering Co.
288	Cleveland Flux Co.
149	Cleveland Pneumatic Tool Co.
245	Clipper Belt Lacer Co.
227, 229	Thomas E. Coale Lumber Co.
206, 235	Cochrane-Bly Co.
254	F. A. Coleman Co.
295	Combined Supply & Equipment Co.
	D
232, 234, 259, 261	*Daily Metal Trade*
10-12	Davenport Machine & Foundry Co.
6	Dayton Pneumatic Tool Co.
256, 258	Debevoise-Anderson Co.
14, 16, 35, 37	Wm. Demmler & Bros.
66	Detroit Electric Furnace Co.
158	Henry Disston & Sons
260, 262	Joseph Dixon Crucible Co.
214, 216	Doehler Die Casting Co.
	E
77, 79	Electric Furnace Co.
294	Electro Refractories Corp.
	F
74, 76	Federal Malleable Co.
232, 234, 259, 261	*The Foundry*
238	Foundry Equipment Co.
	G
87, 89	General Electric Co.
34	Globe Iron-Crush & Shot Co.
57	Robert Gordon, Inc.
59, 61	Grimes Molding Machine Co.
	H
155	Hanna Engineering Wks.
284	Clement Hardy Co.
191	R. G. Haskins Co.
152, 154	Hayward Co.
115, 117	Herman Pneumatic Machine Co.
131	High Speed Hammer Co.
281	Hill & Griffith Co.
109, 111	Hoevel Mfg. Corp.
298	Holcroft & Co.
189	Hyatt Roller Bearing Co.
	I
137, 139	Independent Pneumatic Tool Co.
225	Industrial Controller Co.
128, 129	Ingersoll-Rand Co.
67, 69	International Molding Machine Co.
277, 279	THE IRON AGE
232, 234, 259, 261	*Iron Trade Review*
	K
311, 313	Spencer Kellogg & Sons, Inc.
252	Kuehnle, Inc.
	L
202	H. M. Lane Co.
237	Lava Crucible Co.
249	Leeds & Northrup Co.
173	Link Belt Co.
272, 274, 299, 301	David Lupton's Sons Co.
	M
231, 233	J. S. McCormick Co.
264	*Machinery*
338	McLean Publishing Co.
5	Macleod Co.
75	Malleable Iron Fittings Co.
225	Mechanical Appliance Co.
55	Menefee Foundry Co.
334	*Metal Industry*
302	Metal & Thermit Corp.
250	Michigan Smelting & Refining Co.
292	Mills, Rhines, Bellman & Nordhoff
64	Modern Pouring Device Co.
36	Moline Iron Works
78, 80, 82	Monarch Engineering & Mfg. Co.
	N
114, 116	National Engineering Co.
42, 44, 46, 48	Wm. H. Nicholls Co., Inc.
266	Norma Co. of America
136	Northern Blower Co.
	O
169, 171	S. Obermayer Co.
221	Ohio Body & Blower Co.
156	George Oldham & Sons Co.
118, 120, 122	Osborn Mfg. Co.
58, 60, 62	Oxweld Acetylene Co.
	P
141, 143, 145, 147	Pangborn Corp.
267	J. W. Paxson Co.
232, 234, 259, 261	Penton Publishing Co.
282	Charles E. Pettinos
210	Geo. F. Pettinos
337	Pickands, Brown & Co.
287	Pittsburgh Electric Furnace Corp.
135	Porcelain Enamel & Mfg. Co.
40	Portage Silica Co.
84, 86	Henry E. Pridmore Inc.
	R
157, 159	Racine Tool & Machine Co.
283, 285	Richards-Wilcox Mfg. Co.
174	Rogers, Brown & Co.
108	P. H. & F. M. Roots Co.
54, 56	Royer Foundry & Machine Co.
	S
208	Sabin Machine Co.
265	Safety Equipment Service Co.
151	Shepard Electric Crane & Hoist Co.
167	Simonds Mfg. Co.
7	Skinner Bros. Mfg. Co., Inc.
119, 121, 123, 125	W. W. Sly Mfg. Co.
278, 280, 305, 307	Werner G. Smith Co.
21	Spencer Turbine Co.
1, 2, 3, 4	Sterling Wheelbarrow Co.
——	W. F. Stodder
83, 85	Sullivan Machinery Co.
81	Superarc Welding Machine Co.
140, 142, 144, 146, 148	Syracuse Supply Co.



EXHIBITS AT ROCHESTER WILL BE HOUSED IN THREE LARGE BUILDINGS AT EXPOSITION PARK, CLOSELY ADJACENT TO AN AUDITORIUM IN WHICH THE TECHNICAL SESSIONS WILL BE HELD. EXPOSITION PARK IS ABOUT EIGHT MINUTES' STREET CAR RIDE FROM THE CENTRAL SECTION OF THE CITY AND CAN BE REACHED BY THE DEWEY AVENUE CAR LINE

No. of Booth	Exhibitor
T	
27, 29, 31	Tabor Mfg. Co.
293	W. P. Taylor Co.
236	Taylor Instrument Companies.
9	R. J. Teetor Co.
90, 92, 94, 96, 98, 100	Truscon Steel Co.
U	
297	United Compound Co.
309	United States Graphite Co.
246	United States Silica Co.
V	
49	Vibrating Machinery Co.
W	
197	Wadsworth Core Machine & Equipment Co.
326	H. L. Wadsworth
177	J. D. Wallace & Co.
204	Wayne Oil Tank & Pump Co.
183, 185	Westinghouse Electric & Mfg. Co.
25	Westinghouse Traction Brake Co.
269	White & Bro., Inc.
71, 73	Whitehead Bros. Co.
166, 168, 170, 172	Whiting Corp.
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163	T. B. Wood's Sons Co.
Y	
104, 106	Young Bros. Co.

Committees Which Have Charge of the Rochester Convention

Executive Committee

Norman Van Voorhis, chairman ..... Galusha Stove Works.
P. B. Van Deusen, Secretary ..... Rochester Chamber of Commerce.
Schuyler H. Earl ..... Gleason Works.
Matthew Elliott ..... Erie Foundry Co.
H. G. Hetzler ..... North West Foundries, Inc.
A. H. Jones ..... American Wood Working Machine Co.
George B. Pettingill ..... T. H. Symington Co.
T. A. Soults ..... Sill Stove Works.
Louis P. Willsea ..... Willsea Works.

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W. B. Robinson ..... THE IRON AGE, Pittsburgh, Pa.
W. W. Sanderson ..... Carborundum Co., Niagara Falls, N. Y.
E. A. Scheibe ..... Bausch & Lomb Optical Co.
William J. Wark ..... E. J. Woodison & Co., Buffalo. N. Y.
Delos H. Gray ..... National Brass Mfg. Co.
V. L. Whitehead ..... Whitehead Bros., Buffalo.

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A. C. Kehr ..... Foster-Armstrong Co.
V. C. Kreuter ..... American Laundry Machine Co.
Paul J. Lemke ..... Bausch & Lomb Optical Co.
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S. E. Miller ..... Sargent & Greenleaf, Inc.
S. W. Miller ..... Rochester Welding Works.
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Theodore Pickering ..... Josiah Anstice & Co.
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T. A. Soults ..... Sill Stove Works
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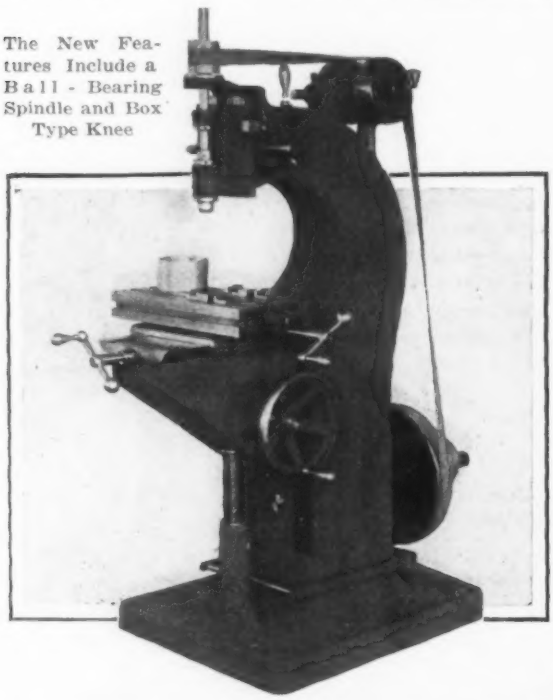
Improves Vertical Milling Machine

The Becker Milling Machine Co., Hyde Park, Mass., has made changes in its No. 2 vertical miller or router, to give much higher spindle speeds than formerly. The actual increase is from 2700 to 6000 r.p.m., which is a speed frequently required by stamp and stencil manufacturers using this equipment and therefore of particular interest perhaps to manufacturers in those lines.

The new features include a ball-bearing spindle and box type of knee. The machines are equipped with a ball auxiliary bearing to take the belt pull, and hardened steel thrust washers are provided on the spindle. The main-spindle bearing is of bronze with babbitt lining and the spindle itself is of crucible machine steel,



The New Features Include a Ball-Bearing Spindle and Box Type Knee

ground all over and carefully balanced. The pulley and all rotating collars and nuts are also balanced.

Two sizes of spindle pulleys are now provided, a 5-in. and a 3-in., the latter for obtaining the higher speeds. In changing it is only necessary to lift the pulley by hand from the sleeve on which it rests and substitute the other. Belt slack is taken up by means of an adjustable idler pulley bracket. It is practical to run the machine at 6000 r.p.m. and in factory tests considerably higher speeds are said to have proved successful. When running at these speeds proper attention to oiling is necessary. With a maximum of 6000 r.p.m. two other speeds, 3240 and 1800 r.p.m., are obtainable by using the 3-in. pulley, and with the 5-in. pulley 3540, 1920 and 1060 r.p.m. The necessary countershaft speed is 540 r.p.m. A special canvas belt particularly suited to these high speeds is part of the regular equipment.

Another improvement is the full box-form knee which provides greater rigidity. A steel chip guard in the knee, in front of the carriage, serves to protect the cross-feed screw.

Simple Test for Monoxide Poisoning

In view of the frequent occurrence of poisoning by carbon monoxide and of the necessity for a test which will assist doctors, safety engineers and first-aid men in recognizing it, the Department of the Interior, acting through the Bureau of Mines has recently made public the results of an investigation which have, according to the bureau, greatly simplified existing test methods. Not only does prompt and accurate diagnosis control the treatment of cases, but it affords a means of making just decisions on claims and of eliminating false illusions and complaints from workmen whose ailments may be from other causes.

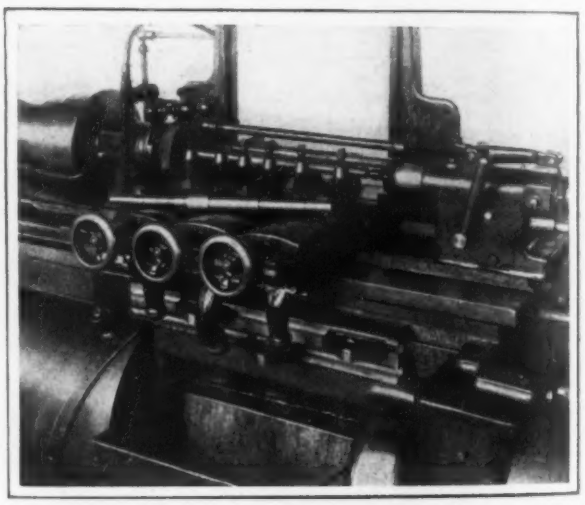
Most cases of carbon monoxide poisoning occur at places—such as garages, around gas and gasoline engines, blast furnaces, after blasting in mines and quarries, after mine fires and explosions, around gas-producer plants and in fact everywhere where there is the possibility of an exposure to the product of combustion of carbonaceous fuel—that are quite distant from laboratories making examinations. The method is based on the use of tannic acid for the quantitative determination of carbon monoxide in the blood and can be used by any person likely to have contact with cases of poisoning. It requires only simple and inexpensive equipment and requires not longer than 8 to 10 min. for completion. Particulars regarding the apparatus may be obtained by requesting the bureau, at Washington, for a copy of bulletin No. 2356.

Necking Attachment for Automatic Lathe

A necking attachment, as illustrated, for use on its full automatic lathe, described in THE IRON AGE of Dec. 1, 1921, has been placed on the market by the Pratt & Whitney Co., Hartford.

The attachment is for squaring shoulders or necking below the turned surfaces of work for grinding, or for any other operation where a cross-feed can be utilized. It consists of multiple carriages to replace the regular carriage of the lathe, and one, two or three of these carriages may be adjustably clamped to the front way of the bed. They carry regular tool slides and provision is made for multiple tool posts. Adjustment for depth of cut is by the handwheels, shown, mounted on screws with graduated dials reading to thousandths of an inch.

The cross slides are actuated, through the medium of roll carrying arms, by the adjustable cams mounted on a cam carrier which is reciprocated longitudinally by the main feed cam of the machine. These cams can



Necking Attachment in Use on Full Automatic Lathe. Adjustment for depth of cut is made by hand wheels shown

be adjusted to provide any sequence of the cross movements, or all slides may be moved in unison, depending on the nature of the work. Suitable oil distribution is provided and all of the automatic functions of the lathe are retained.

The attachment may be conveniently removed and the regular carriage with its actuating parts applied.

"Good Metallurgical Coke" was the subject of a paper presented at a meeting of the Eastern States Blast Furnace and Coke Oven Association, held at the Pittsburgh Field Club, Aspinwall, Pa., May 18, by H. S. Braman, Youngstown Sheet & Tube Co., Youngstown, Ohio. Mr. Braman's paper was supplemented by a talk by W. A. Haven, Republic Iron & Steel Co., Youngstown, Ohio, who also presented lantern slides which detailed with remarkable clearness the micro structure of coke. Dr. John S. Unger, chief, Central Bureau of Research, Carnegie Steel Co., Pittsburgh, discussed the subject from the angle of combustibility.

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ESTABLISHED 1855

THE IRON AGE

EDITORS:

A. I. FINDLEY WILLIAM W. MACON GEORGE SMART

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The Twelve-Hour Problem

In reporting upon the recent White House conference and submitting the problem of the twelve-hour day to the American Iron and Steel Institute last Friday, Judge Gary made two points perfectly clear: First, that the submission places a highly important responsibility upon all the members and presents to them a great opportunity; and, secondly, much depends upon the method of approach in attacking the problem. It is indeed well for the members to realize that they cannot sit back and expect the committee of nine to do everything when its decision will bring from the public commendation or condemnation for all of the 2000 members. The manufacturers were invited to submit their views in writing, and we believe there are few, if any, who have not had some experience or come to some conclusion which will be worthy of recording.

The other point, that of mental attitude, is not less important. If, as Judge Gary said, the members of the institute see only obstacles, nothing will be accomplished. That is true in all the walks of life. If, however, there is a determination to find a satisfactory solution, it is almost certain to be found. In May, 1910, when the American Iron and Steel Institute appointed a committee to prepare a plan for abolishing the seven-day week, giving every employee one day out of seven, it was recognized that difficulties were involved. THE IRON AGE then said: "With their record for the solving of problems that have repeatedly blocked the advance of the industry, the engineers and managers who have done so much to put American steel works practice in the forefront will not be willing to confess failure in advance, when thus challenged to bring about a much desired change." The three-shift day presents far greater difficulties, but the comment of 1910 is nevertheless applicable.

The report of Ernest Greenwood, the American correspondent of the International Labor Office, published in THE IRON AGE of May 18, shows that all of the foreign steel producing countries are now on either a three-shift or an eight-hour day, or both, with rare exceptions relating to continuous operations. In other words, the United States trails the world in the adoption of the shorter day. The report shows that in the case of the change to the reduced number of hours, as so often happens in adopting a reform measure, the expectations of its advocates have not been fully realized. In fact, some of the results have been distinctly disappointing, but it is not recorded that any country has gone back to the twelve-hour system or would dare do so. One of the disappointing results reported by some observers is that the health and happiness of the workers have not been advanced to any marked extent; but troubled Europe, with all its suffering due to the war and political discontent, is not a place in which any change in working conditions could quickly bring results that confidently might be expected in this land of greater possibilities and fewer troubles.

The committee of nine should be able to obtain much valuable information from progressive, humane superintendents and from officials who have been superintendents. A man of this type who has had long experience in one of the large steel companies said to the writer a few days ago: "We ought not to pay the men less than we did in 1915. They cannot live comfortably on less. In fact, we must pay them the pre-war wages plus enough to cover the increase in cost of living. That would mean a basis of about $3.60 per day of eight hours for common labor. It would take a few years, perhaps four or five, to educate the buyers to pay more for steel, to bring this about, but within that time the American steel industry would be in a stronger position that ever."

Railroad rates have gone up and down, tariffs have been raised and lowered, and many other things have happened, but despite occasional periods of depression the greatest American industry has progressed wonderfully in making iron and steel. The question before the industry to-day is whether the adoption of shorter hours would make better men. If so, no doubt there is an influential public sentiment in favor of paying the cost.

With all its complications—and they have been discussed in these columns from every angle—the issue of the three-shift day at iron and steel works

largely sifts down to two questions: 1. Will the workers of the strong arm and strong back type, who have chosen blast furnace and steel works employment because their strength and endurance can earn more there than anywhere else, be satisfied with the pay of other common labor employments? 2. Will the consumers of the products into which steel enters be satisfied to pay for the very considerable increase in cost? This last is really the crux, at least the economic crux, of the whole problem.

Freight Rates and Steel Cost

Taking the freight rates previously in force at 100, the advance of Aug. 26, 1920, made the level 140 for the Eastern group of railroads. The reduction ordered last week by the Interstate Commerce Commission, to be made effective not later than July 1, puts the level at 126, so that there is a reduction of 10 per cent, and rates are put down by 35 per cent of the amount by which they were advanced in August, 1920.

In the case of the iron and steel industry, however, the reduction now ordered represents far less than 35 per cent of the increases in freight charges placed upon the industry since the war started. There had been a number of advances in commodity rates when class rates were not touched, and in various ways the iron and steel industry has had its freight costs increased since 1913. For instance, an entirely new charge, that for slag wasting, has been imposed.

The ore rate from Lake Erie dock to the Mahoning and Shenango valleys has been 99½ cents, made up of 91 cents line haul and 8½ cents dock charge. This will probably be reduced to 90 cents, but the reduced rate of 90 cents will compare with 56 cents before the war, so that it still will be up 61 per cent. After the 10 per cent reduction the rate on coke from the Connellsville region to the valleys will be 75 per cent above the rate in 1913. Iron and steel scrap rates will also be relatively high.

Freight charges to iron and steel producers at different points vary so much, and there is so much difference between the charges falling upon blast furnaces and upon self-contained works producing finished rolled steel products, that no averages can well be struck of the freight charges per ton of product that the iron and steel industry must pay. On account of the attractiveness of round figures, it has often been said that a typical Central Western blast furnace has had to pay of late $10 in freights on raw material per ton of pig iron made, against $5 in 1913. If the 10 per cent reduction now ordered fell upon the whole schedule of transportation charges the decrease in the cost of making pig iron would be $1 a ton, leaving a $4 increase over 1913, but there are some items omitted. Eastern blast furnaces count their freight charges per ton of pig iron considerably above $10.

The case of rates from Lake Superior mines to lake water is not included in the above statement. The expectation is that there will be a reduction of 25 cents, making the rate from the Mesabi and Vermillion ranges 75 cents. This reduction if made will be passed on to ore buyers and the net vessel rate will probably be reduced from 80 cents to 70 cents, apart from the 14 cents collected for dock charges. This would make 35 cents, and the ore producers will probably add at least 15 cents, making a total reduction of 50 cents in iron ore prices f.o.b. Lake Erie docks for the 1922 season. Last season's price on Mesabi non-Bessemer ores was $5.55, base. A 50-cent reduction on 1.8 tons of Lake Superior ore would be 90 cents on a ton of pig iron, while the Northern furnaces, on an average, would have savings on the freights they pay, averaging perhaps 50 or 60 cents more. Pig iron prices ruling a couple of months ago, however, are held to have anticipated these reductions, so that iron was selling at less than current cost. Furnacemen, in other words, do not expect even now that the market will revert to the level of two months ago, the tendency being still upward.

Helpful Plan for Industrial Economies

Again we are to have an economic investigation of metal-working industries. Its object is to find out what may be done in reducing multiplicity of products and otherwise simplifying processes. It follows the engineering inquiry into wastes in industry and it likewise will be undertaken by engineers. Herbert Hoover is in this case as in the other the energizing medium.

The analysis of industrial wastes, human and material, was conducted by the Federated American Engineering Societies. It was started when Secretary Hoover was president of that body. The report was broad in scope and sweeping in its findings. It was not accepted without question by those for whom it was especially intended, and the fears expressed, that it might not result in reforms but be regarded merely as a meritorious contribution to industrial literature doomed to collect dust, seemed likely to be fulfilled. At any rate, technical societies are now asked to canvass their members "to determine what simplification in manufactured products in their fields is most needed and most desirable." It is Secretary Hoover who also makes this suggestion and the job has been accepted by the American Engineering Standards Committee.

In a way the proposed survey is a logical continuation of that of industrial wastes. The latter focused attention on possibilities of simplification and now there is need of a selection of specific cases. If a clear definition of such can be made by the organizations that have learned to function with the standards committee, then a collection of problems needing settlement can be made. It will remain for a third movement to decide which of these are of chief economic importance and how they may be handled in proper order. While industrial engineering problems generally will come under the purview of the present investigation, metal working will be given much consideration, owing to its basic industrial position.

Much is to be expected of this second study of engineering economics by engineers. The American Engineering Standards Committee has won its place as the court of final decisions on what may be accepted as American standards in materials

and engineering practices. The machinery for making such standards is working well. Actually in bringing about harmony among consuming and producing interests it is often causing a reduction in the numbers of sizes and qualities of a given material. Consequently, to expand its activities by canvassing all the opportunities for simplification is simply to continue standardization in a larger degree.

It is easier to point out instances of waste than to correct them and it will be surprising if the result of the study is not a formidable collection of material for the more important step, that of getting the correctives formulated and then applied. The engineering societies undoubtedly will give wholehearted and prompt support to the request, and the movement will serve to establish quickly what the laws of competition might not bring to pass even slowly.

Orders and Contracts for Steel

The delay in steel mills opening their order books freely for third quarter orders and contracts for finished steel products, when according to precedent there should have been free selling by the early part of May, was probably due to uncertainties injected into the situation by the coal strike; but whatever the cause the delay has represented a step in the direction of sounder business practices. Some steel producers have frankly stated that they feared "speculative buying." It was but a few months ago that sellers of steel were wishing that buyers would exhibit some confidence in the market, while now there is fear that buyers will have too much confidence in the future of their requirements.

It has often been said that buyers of steel act "like a flock of sheep." There is nothing uncomplimentary in the observation, unless one wishes to criticize the whole human race, with the gregarious instincts it has had handed down to it from remote ancestry, according to teachings of heredity and psychology now well recognized. The disposition to buy or to refrain from buying is well marked and is simply a fact that must be reckoned with.

The "jug-handled," "option," "requirement" or "accordeon" contract so well known in the American steel industry has often been criticized roundly and with much reason. It is more open to criticism now than before the war, on account of changes that have occurred in the alinement of mills with customers. During the war control many buyers were cut off from their usual sources of supply by the allocation system and some were given new sources. Since the war there have been other disruptions and changes. Furthermore, there have been great increases in the productive capacity of some steel interests as well as great increases in the requirements of some consumers. Altogether it is much more difficult now than before the war for steel producers to rate their customers and distribute contracts to them in such proportions that the tonnage terms are likely to be carried out.

It used to be accepted as one of the features of the steel producing business that the mills would not pass into a period of substantial earnings until several months of a period of active production and consumption had passed. It was regarded as being simply in the nature of the steel business that when producers got work they had to work for nothing for a while, to be reimbursed later by a sort of bonus if the job held out long enough. The results may have proved satisfactory by long period averages, but the procedure hardly represented sound business.

Both sellers and buyers of steel will do well to restrict their forward commitments, provided business is conducted along conservative lines. Mills should not be moved by a fear that they will be left without orders or consumers that they will be left without steel. There should be a co-operative feeling, mills endeavoring to take care of customers and buyers endeavoring to provide mills with as steady employment as possible.

The appearance of delivery premiums should not be taken to indicate an unsound position of the steel market. The delivery premium has a legitimate place in sound business. To the buyer there is given the chance of increasing his operations above the level contemplated by conservative purchases. On the side of the producers, there is the opportunity for the smaller mill, with less capital investment and higher per ton cost than the larger mill, to take profitable business when the going is good and to be content with some idleness when the demand is light. This function of the smaller mills was well recognized before the war. These delivery premiums should rise or fall as conditions dictate, leaving the basis prices to pursue their own natural course.

A Great Open-Hearth Advance

Open-hearth steel works practice in the United States, in which there has been marked progress in recent years, seems on the verge of even more important developments. The closing paragraph of one of the papers before the American Iron and Steel Institute last week on "Methods of Using Fuel in Open-Hearth Furnaces" had this significant statement:

> One cannot help but think that the construction of open-hearth furnaces will be developed along the lines that had to be made to produce the modern high-power blast furnace. By this is meant that the hearth and end walls, including the roof, will probably have to approach the construction of the bosh of a blast furnace, having roof and wall coolers alternating with the brick work. The present pressures on both air and gas are much too low and I see no reason why these should not run up into the pounds instead of ounces per square inch.

Many open-hearth operators may not go so far as the author, but probably all will agree that better control of both fuel and air is necessary to attain rapid and complete combustion. For years there has been a notorious waste of fuel in such furnaces. More recently good progress has been made in subjecting fuel or air or both to control and outputs have increased. The Egler and McKune furnaces are important examples.

In attaining these large outputs by hastening the refining operation much higher temperatures are produced, resulting in another problem, that of refractories; but here in turn much has been done and important results are in sight. Chemistry and the perfection of apparatus for making

brick now promise to produce a series of refractory products that will meet any new temperature conditions that reasonably may be expected. It is claimed, indeed, that this has been attained for the back wall of open-hearth furnaces.

Rapid and complete combustion, accompanied by the necessary control, and the production of a refractory that will stand the higher temperatures, represent radical steps in open-hearth practice. Not only will such furnaces insure a larger output at a lower cost, but it is reasonable to expect a better product due to a greater degree of refining at the higher temperatures.

Attention has been attracted to the growth of British exports of galvanized sheets in recent months. However, American exports have been even more noteworthy. In 1913 British shipments averaged 63,500 gross tons per month, falling to 34,200 tons and 17,600 tons per month in 1920 and 1921 respectively. In the first quarter of this year, however, the rebound carried the average up to 47,700 tons per month or about 75 per cent of the pre-war rate. In American galvanized sheets the best pre-war record was 9500 tons per month in 1913. There was a decline to 4600 tons per month in 1921, but for the first three months of this year the average has been 11,734 tons, or nearly 25 per cent more than before the war—this in the face of a great decline in steel exports generally. The movement in galvanized sheets, because of its effect on the spelter market both here and in England, is watched closely. Great Britain has long had the call on the world's needs in this product and on the score of exchange would still be presumed to have an important advantage.

CORRESPONDENCE

To Standardize Files

To the Editor:—We have noted with interest the article in THE IRON AGE, Vol. 109, No. 21, on the National Association of Purchasing Agents' meeting. We are offering for consideration by the organization of purchasing agents a plan for the standardization of reference files.

It no doubt is a common experience with all manufacturers that the mails are being loaded with a variety of advertising literature, all gotten up with the idea of attracting attention. The result is that there is a confused mass of his literature, most of it perhaps being consigned to the waste paper basket. And yet as a matter of fact only too often it happens that the information submitted has value and should have a place in the reference file.

To handle in a most expeditious manner, we propose that in the first place the files containing the reference cards be made of standard dimensions. Then instead of having a heterogeneous mass of mail, we would suggest that the printing of all advertising be confined to cards suitable to fit the files mentioned.

Upon receipt, instead of transferring as is now the case upon the records, this very card which comes through the mail would find a place in the file without any alteration. Classifications no doubt could be standardized.

There is no doubt that a lot of time would be saved and a more permanent record would be the results.

STEINER BROS., Machinists,
P. Steiner.

Lima, Ohio, May 26.

COAL STRIKE SITUATION

Production Increases Slowly—Much Very Poor Coal Shipped

PITTSBURGH, May 30.—While the drift of the coal strike situation as it concerns nearby union fields is in the direction of improvement from the production standpoint, betterment still is pretty gradual. At the moment, pending the outcome of the conference in Washington on Wednesday, when it is expected that plans will be perfected for the proper direction of production and a schedule of fair prices will be established, manufacturers here are drawing upon their accumulated stocks and are making so few purchases that prices are extremely soft. Production in nearby fields, however, is not gaining with much rapidity and the dependence of steel makers upon outside fields is far from being relieved. Loading soft coal in western Pennsylvania last week averaged slightly in excess of 2000 cars daily as compared with slightly more than 1900 cars daily in the previous week. Figures compiled by the geological survey indicate the production of soft coal last week at close to 5,000,000 tons, this being the best week in the matter of production since the outbreak of the strike.

Prices have receded further in the past week with both Connellsville and Southern coal now quotable at $2.75 to $3 per net ton at mines. This is a decline of from $1 to $2 per ton from recent peak prices, but it has been the lack of buying, pending the Washington conference, over the past 10 days rather than an increase in production that has brought about this change. Accumulated stocks have been drawn upon and the impression is that after Wednesday there is apt to be a rush of buying and a stiffening in prices.

The productions of coke in the Connellsville district also is gaining, the Connellsville *Courier* placing the output for the week ending May 20 at 57,430 net tons as against 54,150 tons in the previous week and 52,200 tons in the week ending May 6, which marked the low point of oven activities. Much of the coke now coming upon the market is extremely poor in quality, and while good coal is obtainable from southern West Virginia and eastern Kentucky fields, much poor coal is being shipped. It is evident that some of the operators are taking advantage of the buyers' needs of coal and are not grading with the usual care.

The Steel Merger

In view of the holiday of May 30, the putting to press of this issue of THE IRON AGE was advanced to Monday, May 29. As this is written (Monday evening) the expectation among those likely to be informed on the proposed merger of steel companies is that a further conference on details will be held in New York on May 30 and that an announcement as to the participation of the Republic Iron & Steel Co., Midvale Steel & Ordnance Co. and Inland Steel Co. will probably be made on May 30 or June 1.

Canton Sheet Steel Plant Sold

The plant of the Canton Sheet Steel Co., Canton, Ohio, has been sold by the Hydraulic Steel Co., Cleveland, to the United Alloy Steel Corporation, Canton. The plant includes four 80-ton open-hearth furnaces, blooming and sheet bar mills and 13 sheet mills. Its annual capacity is 150,000 tons of ingots and 124,000 tons of sheets. The plant was purchased by the Hydraulic company five years ago, but the old corporate organization was maintained. The terms of sale have not been made public. The United Alloy Corporation expects to place the steel plant in operation in two weeks and the sheet mills a little later.

The Acme Machine Co., Hartford, Conn., has filed a petition in bankruptcy in the United States District Court at New Haven, giving assets at $20,467.50, and liabilities of $67,150.73.

Iron and Steel Exports Decrease Again

April Figures 10,000 Tons Below March—Imports Gain 4600 Tons—Japan the Best Buyer—Machinery Exports Fall Off Slightly

WASHINGTON, May 29.—Exports of iron and steel in April totaled 198,830 gross tons, valued at $17,563,662, a decline of approximately 10,000 tons under March, whose exports aggregated 208,843 tons. Imports made an increase of approximately 4600 tons in April, totaling 18,750 tons, valued at $2,888,790, as compared with 14,140 tons in March. Exports of machinery, exclusive of vehicles, amounted to $19,191,148, as compared with a value of $19,932,526 in March.

For the 10-month period ending with April, 1922, exports of iron and steel amounted to 1,268,931 tons, valued at $145,413,648, as compared with 3,974,754 tons, valued at $568,930,938, for the same period last year. April exports for the current year exceeded by a little more than 36,000 tons those of April, 1921, when they were 162,952 tons, valued at $25,910,579.

Japan, continuing to be the biggest foreign buyer of American steel, took an aggregate of 52,591 tons of plates, black sheets, tin plate, steel rails and plain wire, in April, and for the 10-month period took 342,012 tons of these five classes of steel. The largest item exported in April was black sheets, the movement amounting to 29,170 tons, of which Japan took 23,949 tons, while out of the total of 240,886 tons exported during the 10 months, Japan took 202,488 tons, or 84 per cent.

Imports in April of this year exceeded by more than 11,000 tons those of the same month last year, when they amounted to 7151 tons, valued at $2,779,203. For the 10-month period ending with April, 1922, however, imports were almost 100,000 tons less than they were for the same period of last year, the respective totals being 124,298 tons, valued at $22,989,037, and 223,977 tons, valued at $38,579,033. The biggest manufactured item imported in April of this year was pig iron, the inbound movement of this product being 5968 tons.

Manganese ore imports in April totaled 25,559 tons, valued at $133,715, as against 69,710 tons in March, while for April of last year they amounted to 47,260 tons, valued at $318,081. For the 10-month period ending with April, this year, manganese ore imports totaled 166,362 tons, valued at $918,256, as against 610,938 tons, valued at $9,814,404, for the corresponding period ending April, 1921.

The largest single item in the industrial machinery list exported in April was textile equipment, with a value of $1,598,124. Exports of agricultural implements and machinery were valued at $1,918,109. Lathes to the value of $45,608 were exported in April.

Exports of Iron and Steel—Gross Tons

	April		Ten Months Ending April	
	1921	1922	1921	1922
Pig iron	1,234	2,750	121,451	22,447
Ferromanganese	218	241	3,335	925
Ferrosilicon	....	....	523	363
Scrap	2,662	10,599	174,745	38,332
Ingots, blooms, billets, sheet bar, skelp	678	9,376	80,694	36,858
Iron and steel bars	8,196	27,814	493,523	56,562
Alloy steel bars*	....	174	.....	4,270
Wire rods	1,403	6,988	54,834	33,191
Plates, iron and steel	29,007	13,082	734,722	93,128
Sheets, galvanized	4,173	8,748	87,172	62,057
Sheets, black steel	7,193	29,170	137,860	240,886
Sheets, black iron	1,550	793	23,188	5,334
Hoops, bands, strip steel	999	2,806	36,217	19,462
Tin plate, terne plate, etc.	3,046	4,663	174,022	64,101
Structural shapes, plain material	19,831	9,978	490,498	89,092
Structural material, fabricated	1,239	2,632	29,719	16,659
Steel rails	31,392	17,891	506,026	172,678
Rail fastenings, switches, frogs, etc.	901	3,563	13,231	15,576
Boiler tubes, welded pipe and fittings	36,374	14,652	377,627	127,550
Cast iron pipe and fittings	4,790	2,361	68,307	21,982
Plain wire	3,580	12,412	162,370	59,731
Barbed wire and woven wire fencing	971	5,666	84,242	25,747
Wire cloth and screening*	....	97	.....	309
Wire rope and cable*	....	273	.....	.....
Wire nails	767	6,775	71,052	40,814
All other nails and tacks	267	740	12,683	5,403
Horseshoes	73	49	1,461	445
Bolts, nuts, rivets and washers, except track	2,048	1,651	35,252	11,439
Car wheels and axles†	....	1,278	.....	.....
Iron castings†	....	1,091	.....	3,532
Steel castings†	....	265	.....	.....
Forgings†	....	237	.....	.....
Machine screws†	....	15	.....	58
Total	162,592	198,830	3,974,754	1,268,931

*Not reported separately, prior to January, 1922.
†Previous to January, 1922, reported by value only.

Exports, January, 1920, to April, 1922, Inclusive

	Gross Tons		
	All Iron and Steel	Pig Iron	Semi-finished Material
Calendar year 1919	4,239,837	309,682	258,907
January, 1920	333,601	18,468	19,937
February	308,185	15,739	22,693
March	417,216	22,740	30,444
April	395,120	14,608	19,032
May	420,359	13,032	16,370
June	402,707	17,075	29,811
Fiscal year 1920	4,212,732	248,126	288,766
July	458,866	29,647	17,243
August	431,484	22,645	20,920
September	409,200	22,724	18,113
October	452,015	17,296	11,853
November	434,297	13,929	7,042
December	498,765	10,055	3,415
Calendar year 1920	4,961,851	217,958	216,873
January, 1921	547,394	3,710	315
February	393,328	1,307	92
March	230,635	2,320	1,023
April	162,592	1,234	678
May	142,551	2,541	749
June	119,081	1,689	1,106
Fiscal year 1921	4,168,619	129,541	82,549
July	86,523	2,744	363
August	75,827	2,424	2,447
September	95,169	3,078	1,318
October	106,582	2,830	153
November	122,290	1,299	1,869
December	134,415	2,550	250
Calendar year 1921	2,213,042	28,305	10,363
January, 1922	160,920	1,043	4,683
February	133,975	1,430	6,627
March	208,843	2,724	10,002
April	198,830	2,750	9,376
Ten months	1,268,931	22,447	38,332

Imports of Iron and Steel—Gross Tons

	April		Ten Months Ending April	
	1921	1922	1921	1922
Ferromanganese	2,115	2,380	42,657	12,411
Ferrosilicon	191	456	6,659	8,905
Pig iron	2,781	5,968	45,195	30,146
Scrap	1,284	4,430	80,461	33,677
Steel bars	124	900	4,103	3,432
Bar iron	10	541	3,468	2,602
Structural steel	74	160	1,250	1,134
Billets, without alloys	3	382	750	10,140
All other billets	128	160	3,271	761
Steel rails	298	3,149	28,744	19,557
Sheets and plates	2	11	2,378	271
Tin and terne plates	79	144	463	208
Wire rods	62	69	4,578	1,054
Total	7,151	18,750	223,977	124,298
Manganese ore and oxide	47,260	25,559	610,938	166,362

Following are exports of some of the leading products to the chief countries of consumption:

	April, 1922	10 Months Ending April, 1922
Plates		
Canada	5,663	48,435
Japan	2,614	12,107
Australia	2,039	4,788
Black Steel Sheets		
Japan	23,949	202,488
Canada	3,665	22,706
Tin Plate		
Japan	1,809	29,312
Canada	1,285	18,336
Steel Rails		
Japan	9,358	70,711
Canada	1,672	23,762
Brazil	1,019	3,552
Wire, Except Barbed		
Japan	4,861	27,394
Canada	2,121	11,174
Argentina	1,494	4,458
Total	60,539	479,223
Total of above exported to Japan	42,591	342,012

Miners Gradually Returning

UNIONTOWN, PA., May 27.—Disintegration of the union effort at organization of the Connellsville bituminous field continues on an increasing pace during the eighth week of the national coal strike. Developments of the week indicate unmistakably that the strike spirit has been broken, the chief indication being the increased production. Figures available this week, collected by the Connellsville *Courier*, show that the production gain during the seventh week of the strike was almost double that of the sixth week while the production figures for the eighth week, as yet unavailable, will show an even greater percentage of increase.

The *Courier* figures show the regional output during the seventh week as 57,430 tons, a gain of 3280 tons over the preceding week, which was a gain of 1950 tons over the week preceding that.

Letters received by your correspondent during the week from miners who sign their names to the communications indicate unmistakably that the sentiment is for a return to work. Letters have come in almost daily during the past several weeks, but until this week few of them have borne the signatures of the writers.

Production of both coal and coke by the H. C. Frick Coke Co. is showing a big gain this week. Figures are unavailable but scores of Frick miners have returned to their places in the mines, quietly and without any announcement being available at the Frick offices. A considerable number of Frick ovens have been fired, the exact number being closely veiled.

Production figures since the strike began in the region show:

Week Ending	Production	Decrease	Weekly Gain
April 1	149,960	.....	....
April 8	134,420	15,540	....
April 15	98,810	36,610	....
April 22	64,980	33,830	....
April 29	54,230	10,750	....
May 6	52,200	2,030	....
May 13	54,150	.....	1,950
May 20	57,430	.....	3,280

The Connellsville *Courier* makes these comparisons of production for this year and last year during the period of the present strike:

	1922		1921	
Week Ending	Ovens in	Production, tons	Ovens in	Production, tons
April 1	11,964	149,960	4,712	50,075
April 8	12,884	134,420	3,178	34,765
April 15	9,098	98,810	4,443	47,220
April 22	5,698	64,980	4,768	51,580
April 29	4,863	54,230	4,536	48,710
May 6	4,820	52,200	2,873	50,520
May 13	5,106	54,150	3,788	43,290
May 20	5,368	57,430	3,824	42,680

Action of the Federal Government in arranging for the selection of district committees had an immediate effect on the market situation in the region. Coal price quotations dropped to around $3.25 a ton and there was a sharp cancellation of orders and withdrawal of inquiries.

Reports are current here this week that a large number of mines, including some of the larger operations, in the southern Connellsville region, are planning to resume operations on Wednesday. Plans were made to start some of the plants on Monday morning but were delayed due to the fact that Tuesday is Memorial Day.

ORDERS FOR THIRD QUARTER

Valley Mills Booking Business with Prices to Be Named Later

YOUNGSTOWN, May 29.—Third quarter tonnages are being entered on Valley steel makers' books, but largely at prices to prevail at time of shipment. Moderate advances are expected to apply, in line with higher production costs directly traceable to the coal strike. In sheets and tinplate, especially, there will be a substantial carryover from the second to the third quarter. Buyers are apparently less disposed to pay premium prices for delivery concessions than they were earlier in the month, inasmuch as the miners' strike has failed to cut into production as heavily as anticipated.

Valley interests are confident of continued firm demand for steel products through balance of the year. Building activities and railroad requirements continue to afford a big outlet for steel commodities.

May proved the most satisfactory month of the year from the standpoint of production, shipments and earnings insofar as Valley independents are concerned. Capacity in the Mahoning Valley is engaged at four-fifths of normal; were it not for the fuel situation, producers believe their mills would be operating at capacity.

Improvement in Coal Situation

Substantial improvement in the non-union mine situation is anticipated by July 1. Coal prices in the Kentucky and West Virginia fields, stimulated to sharp advances by heavy industrial purchases, show moderating tendencies. Coal available for coking purposes is now purchasable at $3 per ton, as compared with a recent range from $3.25 to $3.50. In fact, one Valley independent which refused to go beyond $2.50 until recently, believes coal will shortly be available in quantities under $3.

A district strip maker has advanced its quotation on hot strip to 2.40c. from 2.25c., comparing with a low several months ago of 1.75c.

New sheet buying has temporarily subsided, but makers declare there is a heavy overhanging demand which will manifest itself as soon as third quarter prices are established. The most active buyers in the current market are automobile interests seeking full finished stock. The leading independent has opened its books for next quarter business, but no prices are being named on future commitments.

Plans are being developed by the Electric Alloy Steel Co. for installation of open hearth alloy steel furnaces and rolling mills on a site at Niles. Orders for special analysis and high speed steels are still in small quantities, coming from consumers which frequently bought in carlots. It is not expected orders will become sizable until stocks accumulated by manufacturing consumers during the war and by warehouse interests are further liquidated. More normal buying by the tool industry is expected in the fall. Current purchases are largely to balance stocks carried by consumers, states a representatitive of the interest.

Semi-Finished Steel Firm

In the semi-finished market, the $35 price continues to apply on sales of sheet bars, slabs and billets. One Valley maker indicates that this may be advanced to $37.50 next quarter, especially to occasional buyers. The $35 minimum has been well established as the basis of contract tonnage to regular customers.

The plate market is quickening under the influence of enlarged requirements for tank and tank car construction, while light plates are in demand for car repair work, which is assuming large proportions in the aggregate. The lighter gages are commanding appreciably higher prices than the nominal market.

One maker states that 3.25c. is representative of the actual present-day market on black sheets; current rollings were largely booked at less, while quite a few small-lot tonnages have brought higher prices. Demand for the three grades is well distributed. Seconds and wasters sell readily, in view of the lower prices asked.

Iron and Steel Markets

FREIGHT FACTOR SMALL

Ten Per Cent Reduction Has Little Effect on Steel Market

Steel Corporation's Conservative Attitude on Prices of Finished Material

Steel trade conditions are increasingly favorable. Output is well maintained at an average for the industry somewhat over 70 per cent. New buying, while not so active in some lines, is sufficient to keep prices firm, with here and there an advance, chiefly on early deliveries.

The 10 per cent reduction in freight rates was a disappointment for which there is partial compensation to steel manufacturers in the fact that the railroad wage reduction just made and those expected will leave the railroads with as great buying power as at present, perhaps more.

Some holding up of shipments is looked for, seeing that the reduced freights are made effective July 1. There is more of this in pig iron than in finished material. The iron ore trade in particular will feel this, in view of its short lake season, and a movement is on, with promise of success, to have the ore freight reductions apply from June 10.

The ninth week of the coal strike shows continued but very gradual improvement in soft coal production in Western Pennsylvania. Bituminous output for the country last week, at 5,000,000 tons, was the largest since April 1. But steel companies, apart from the Steel Corporation, are drawing on their stocks and must still depend much on outside fields. The settling of coal prices to $3 is due to lack of buying pending the Washington conference. Coke is so high, at $6 to $6.50, as to check blast furnace resumptions, yet an offer of $7 is reported, as against $3 prior to April 1.

Lake Superior iron ore sales, which would establish prices for 1922, were looked for this week, but there are delays over ore rates from mine to dock and lake vessel rates. Ore buyers have looked for a 50-cent reduction from 1921 ore prices. Estimates of the ore movement this season range from 35,000,000 to 42,000,000 tons, against shipments of 22,000,000 tons last year.

Sales of Southern pig iron have been made in several markets at an advance of 50c. per ton, or $18.50, Birmingham, but $18 iron is still to be had. In the Philadelphia district sales of 5000 to 7000 tons of basic have been made at an advance of at least $1 per ton. For the most part, prices are stationary. Sales of 2000 tons of Belgian iron and an equal amount of British iron for future delivery are reported at San Francisco at about $30, delivered, but domestic iron is selling in that market at a somewhat higher price. In the East, the expectation is that sales of foreign pig iron will not be large, but the possibility of importing may have a tendency to check the upward trend of prices of the domestic product.

One blast furnace in the Pittsburgh district and two in the Youngstown district will start up soon if a continuous coke supply can be arranged, but Connellsville coke operators are not able to make long-time contracts.

In finished material markets the prices at which the Steel Corporation will sell sheets, tin plates and wire products in the third quarter are a matter of no little interest. No announcement has been made, but indications favor the continuance of present prices on all three lines.

Mills in the Chicago district appear to be sold up in some lines for the full third quarter, largely because railroad steel is the chief factor there. Of more than 70,000 cars placed this year, fully 50,000 will be built in car works drawing steel from Chicago. It the Central West, especially at Pittsburgh, railroads have not taken out the rails ordered for 1922 as fast as expected.

Fabricated steel business dwindled in May until the total tonnage of awards is hardly two-thirds of that of April, but at that it is 10 per cent above the May average for the past ten years. New structural steel projects did not add much over 11,000 tons to the pending list.

With late orders placed for upward of 4300 cars and steel-car bodies, railroad equipment buying goes on apace, and much more is expected, seeing that one of the country's most important lines has bought no cars for many months. Active car repair and reconstruction inquiries involve over 10,000 cars.

THE IRON AGE composite price for pig iron continues at $23.71 per gross ton. Two weeks ago it was $23.63; a month ago, $22.23, and a year ago, $22.46. The composite price for finished steel remains 2.127c. per lb., against 2.084c. a month ago and 2.764c. a year ago.

Pittsburgh

Freight Rate Reduction Has Little Effect — Steel is Active

PITTSBURGH, May 30.

So far the announcement of a reduction in freight rates has had little or no effect upon the iron and steel market other than to create the expectation that unless the rates become effective immediately instead of July 1, buyers may seek to defer the shipment of such materials as they can get along without until after July 1, in order to take advantage of the reduction. As explained elsewhere in this issue, the freight rate reduction, provided there is a corresponding cut in the lake water rate and the upper lake rail rate is reduced, as expected, 25c. per ton, the saving to Valley furnaces is a matter of slightly more than $1.20 per ton. Since the freight charges in a ton of steel at the old rates were figured at from $8 to $8.50, the reduction would be 10 per cent of this total, or 80c. to 85c. per ton. There is no thought, however, that the freight rate cut will show in selling prices because it is more than offset by the increase which has lately taken place in fuel costs, and if the steel industry is able to eliminate the 12-hr. work day, there cannot fail to be an increase in labor costs.

The steel business still is good, although lacking in the feverishness that marked the demand for some lines

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	May 30, 1922	May 23, 1922	May 2, 1922	May 31, 1921
No. 2X, Philadelphia‡	$26.26	$26.26	$25.40	$25.50
No. 2, Valley furnace†	24.00	24.00	23.00	23.00
No. 2, Southern, Cin'ti†	22.50	22.50	21.50	26.50
No. 2, Birmingham, Ala.†	18.00	18.00	17.00	22.00
No. 2 foundry, Chicago*	23.00	23.00	22.00	22.00
Basic, del'd, eastern Pa	**25.00**	24.00	23.50	25.00
Basic, Valley furnace	25.00	25.00	23.00	21.75
Valley Bessemer, del. P'gh	26.96	26.96	23.96	25.96
Malleable, Chicago*	23.00	23.00	22.00	22.00
Malleable, Valley	24.50	24.50	23.00	24.00
Gray forge, Pittsburgh	25.46	25.46	24.46	23.96
L. S. charcoal, Chicago	29.00	29.00	28.00	37.50
Ferromanganese, seaboard	65.00	65.00	65.00	80.00
Rails, Billets, etc., Per Gross Ton:				
O.-h. rails, heavy, at mill	$40.00	$40.00	$40.00	$47.00
Bess. billets, Pittsburgh	35.00	35.00	32.00	37.00
O.-h. billets, Pittsburgh	35.00	35.00	32.00	37.00
O.-h. sheet bars, P'gh	35.00	35.00	31.00	39.00
Forging billets, base, P'gh	**40.00**	38.00	37.00	42.00
O.-h. billets, Phila	40.77	40.77	36.74	42.74
Wire rods, Pittsburgh	38.00	38.00	38.00	48.00
	Cents	Cents	Cents	Cents
Skelp, gr. steel, P'gh, lb.	1.70	1.70	1.50	2.20
Light rails at mill	1.50	1.50	1.50	2.20
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	1.96	1.96	1.96	2.25
Iron bars, Chicago	1.70	1.70	1.65	2.25
Steel bars, Pittsburgh	1.60	1.60	1.50	2.10
Steel bars, Chicago	1.70	1.70	1.60	2.48
Steel bars, New York	1.88	1.88	1.88	2.48
Tank plates, Pittsburgh	1.60	1.60	1.50	2.20
Tank plates, Chicago	1.70	1.70	1.60	2.58
Tank plates, New York	1.98	1.98	1.88	2.58
Beams, Pittsburgh	1.60	1.60	1.50	2.58
Beams, Chicago	1.70	1.70	1.60	2.20
Beams, New York	1.98	1.98	1.88	2.58
Steel hoops, Pittsburgh	2.25	2.25	2.00	2.75

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.

†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

Sheets, Nails and Wire,	May 30, 1922	May 23, 1922	May 2, 1922	May 31, 1921
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh	3.15	3.15	3.15	4.00
Sheets, galv., No. 28, P'gh	4.15	4.15	4.15	5.00
Sheets, blue an'l'd, 9 & 10	2.40	2.40	2.40	3.10
Wire nails, Pittsburgh	2.40	2.40	2.40	3.00
Plain wire, Pittsburgh	2.25	2.25	2.25	3.00
Barbed wire, galv., P'gh	3.05	3.05	3.05	4.10
Tin plate, 100-lb. box, P'gh	$4.75	$4.75	$4.75	$6.25
Old Material, Per Gross Ton:				
Carwheels, Chicago	$18.00	$18.00	$19.50	$14.00
Carwheels, Philadelphia	17.00	17.00	16.00	18.00
Heavy steel scrap, P'gh	17.50	17.50	17.00	13.50
Heavy steel scrap, Phila.	15.00	15.00	14.50	12.00
Heavy steel scrap, Ch'go	*14.50*	14.75	15.25	11.50
No. 1 cast, Pittsburgh	18.50	18.50	18.50	18.00
No. 1 cast, Philadelphia	18.50	18.50	18.00	18.00
No. 1 cast, Ch'go (net ton)	16.00	16.25	16.25	13.50
No. 1 RR. wrot, Phila.	17.00	17.00	16.50	15.00
No. 1 RR. wrot, Ch'go (net)	12.75	12.75	13.00	10.50
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$6.00	$6.00	$6.00	$3.25
Foundry coke, prompt	6.50	6.50	6.00	4.50
Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	13.87½	13.87½	13.00	13.25
Electrolytic copper, ref'y	13.62½	13.62½	12.75	13.25
Zinc, St. Louis	**5.25**	5.15	5.02½	4.75
Zinc, New York	**5.60**	5.50	5.37½	5.25
Lead, St. Louis	5.45	5.45	5.25	4.70
Lead, New York	**5.75**	5.70	5.40	5.00
Tin (Straits) New York	**31.25**	30.75	31.25	31.50
Antimony (Asiatic), N. Y.	5.37½	5.37½	5.37½	5.25

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Composite Price, May 29, 1922, Finished Steel, 2.127c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets

These products constitute 88 per cent of the United States output of finished steel

May 23, 1922,	2.127c.
May 2, 1922,	2.084c.
May 31, 1921,	2.764c.
10-year pre-war average,	1.689c.

Composite Price, May 29, 1922, Pig Iron, $23.71 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham

May 23, 1922,	$23.71
May 2, 1922,	22.23
May 31, 1921,	22.46
10-year pre-war average,	15.72

a few weeks ago. Prices show decided firmness all along the line, notably in semi-finished material. Several makers of hoops, bands and hot-rolled strips in the past week have gone to a minimum of 2.40c. base, Pittsburgh, but as yet this advance has not been followed by the Steel Corporation. It is now pretty generally accepted that the Steel Corporation will continue its present prices of tin plate and sheets for the third quarter and last half, and lately it has become apparent that this interest does not contemplate any immediate change in its prices on wire products. It is possible that some of the independent sheet makers will follow the advance recently made by the Inland Steel Co. of $3 per ton on black and galvanized sheets and $2 per ton on blue annealed sheets, but since not a few of the independent makers have taken third quarter business freely at the present quotation, an advance would be considered to be merely an effort to stimulate specifications.

The Carnegie Steel Co. has 36 blast furnaces active to-day, but it is likely to put one furnace down within a day or two and by the end of the week will have only 35 furnaces on. Active ingot capacity of this company is around 75 per cent. The Pittsburgh Steel Co. will put on a furnace soon and if a continuous supply of coke could be arranged the Sharon Steel Hoop Co. and Struthers Furnace Co. in the Youngstown district each would put on a furnace. The coke situation in the Connellsville district has not improved sufficiently to allow operators to enter into long time agreements and the possibility of the Youngstown slacks starting up is rather remote.

The scrap market has been featured by a sale of about 25,000 tons of heavy melting steel at $17.50 and by a deal between two Monongahela River steel companies involving between 10,000 and 12,000 tons. The pig iron market is absolutely devoid of life.

Pig Iron.—The trade here does not readily recall a quieter period than the past two weeks have been. Inquiries are coming out in fair number, but sales are few and usually of very small lots, and the prospect is that until the full extent of the freight rate reduction is known, buyers will act cautiously. At present the thought is that any benefit which may be derived from the freight rates reduction will be more than offset by the high fuel costs. The increase in coke prices since

the outset of the coal miners' strike is a matter of at least $3 per ton, and it is said that continuous supplies of coke cannot be had at under $7, which is $4 per ton above the price just prior to April 1. This contrasts with an estimated saving of about $1.25 in freights on materials required for a ton of pig iron. We make no change in prices.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being $1.96 per gross ton:

Basic	$25.00
Bessemer	25.00
Gray forge	$23.50 to 24.50
No. 2 foundry	24.00 to 25.00
No. 3 foundry	23.50 to 24.50
Malleable	24.50

Ferroalloys.—Domestic ferromanganese prices are a shade easier, this material being available at the same price as the English products, or $67.50 Atlantic seaboard. It seems that the price of $70 was based upon the fear of makers that coke would be hard to obtain on account of the coal miners' strike, but enough coke is available to maintain production. With most of the business going to English producers, it has been necessary for domestic makers to meet the English price to dispose of production. On small tonnages for prompt shipment $70, seaboard, still is asked on domestic 80 per cent material, but on round tonnages for extended delivery the price is not above $67.50. Spiegeleisen for early delivery is hard to obtain, as the principal commercial maker is sold up against probable production of the next few months.

We quote 78 to 82 per cent ferromanganese, $67.50 to $70 c.i.f. Atlantic seaboard for domestic and $67.50 for English. Average 20 per cent spiegeleisen, $34 to $35 furnace; 16 to 19 per cent, $33 to $34 furnace; 50 per cent ferrosilicon, domestic, $55 to $60 furnace, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, $41.50; 11 per cent, $44.80; 12 per cent, $48.10; 13 per cent, $52.10; 14 per cent, $57.10; silvery iron, 6 per cent, $30; 7 per cent, $31; 8 per cent, $32.50; 9 per cent, $34.50; 10 per cent, $36.50; 11 per cent, $39; 12 per cent, $41.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is $4.06 per gross ton.

Steel Skelp.—Such business as is being done, and it is not much because makers have little for sale, generally is at 1.60c. to 1.65c. for sheared skelp and from 1.70c. to 1.75c. for grooved.

Iron and Steel Bars.—The mills all are heavily committed on steel bars, and 1.60c. is as low as any orders now can be placed. Some of the independents are quoting 1.70c. and 1.75c., Pittsburgh, but these prices are not obtainable except from buyers who are in a great hurry for shipments. For the general run of new business at 1.60c., delivery is not promised short of six weeks, although a little tonnage is being accepted for fairly early delivery at that price when it can be fitted into existing mill schedules. Iron bars are unchanged.

We quote steel bars rolled from billets at 1.60c. to 1.75c.; reinforcing bars, rolled from billets, 1.60c. to 1.75c. base; reinforcing bars, rolled from old rails, 1.50c.; refined iron bars, 2.10c. in carloads, f.o.b. mill, Pittsburgh.

Wire Products.—Current demands are chiefly of a piecing out character, although most of the independent companies are entering some business in plain wire for third quarter delivery. Forward business in other products is checked by the difference between the prices quoted by the independents and the American Steel & Wire Co. Outside of plain wire, quotations of independents range $2 per ton above those of the leading interest and the former are waiting for some definite price announcement by the latter before committing themselves on tonnage for delivery after July 1. The freight rate reduction is not expected to result in any lower prices for wire products, but it is feared that specification against existing orders will be slower next month than they have been, especially on such supplies as buyers can get along without until after July 1.

We quote wire nails at $2.40 to $2.50 base per keg, Pittsburgh, and bright basic and Bessemer wire at $2.25 base per 100 lb., Pittsburgh.

Billets, Sheet Bars and Slabs.—A Valley maker is reported to have taken about 6000 tons of sheet bars at $35, Youngstown, and a Valley maker of hoops and bands is said to have paid $36 for small billets. There are still rather good sized inquiries in sheet bars and soft billets, but actual business remains light because makers have so little tonnage to sell. Although the coal strike in the non-union fields seems to be slowly breaking up, it is still a restrictive factor on production. Such pig iron as is being produced from coke at current prices is costly and scrap is not available except at rather stiff prices.

We quote 4 x 4-in. soft Bessemer and open-hearth billets at $35; 2 x 2-in. billets, $35; Bessemer and open-hearth sheet bars, $35; slabs, $35; forging billets, ordinary carbons, $40, all f.o.b. Youngstown or Pittsburgh mills.

Wire Rods.—The market is inactive, but fairly firm, in the absence of large offerings, at $38 for the base size soft rods.

We quote No. 5 common basic or Bessemer rods $38, chain rods $38, screw stock rods, $43; rivet and bolt rods and other rods of that character, $38. High carbon rods, $45 to $48, depending on carbons, per gross ton, f.o.b. Pittsburgh or Youngstown.

Structural Material.—The market is now well established at 1.60c., Pittsburgh, as a minimum, and on heavy beams deliveries more promptly than six weeks are not being promised because the mills are so well sold up. Prices are given on page 1553.

Plates.—Mills in this and nearby districts are well engaged, but deliveries against new orders can be made much more promptly than in the case of bars or large shapes. Prices of less than 1.60c., Pittsburgh, have practically disappeared in the last week.

We quote sheared plates, ¼ in. and heavier, tank quality, at 1.60c. to 1.75c., f.o.b. Pittsburgh.

Steel Rails.—Specifications against orders for standard rails are a little disappointing. Evidently the railroads have all the rails they figure they can lay or are satisfied that supplies will be available when they are wanted. Light rails are in moderate demand only, with the price unchanged at 1.50c., base.

We quote 25 to 45-lb. sections, rolled from new steel, 1.50c. base; rolled from old rails, 1.40c. base; standard rails, $40 per gross ton mill for Bessemer and open-hearth sections.

Iron and Steel Pipe.—Buying of steel pipe continues good, with the mills still watching specifications closely and not letting buyers have more than their usual quotas. Observance of the Dec. 15, 1921, card is good, though slight concessions still are being made on line pipe. Wrought iron pipe in the merchant sizes moves steadily. Discounts are given on page 1553.

Boiler Tubes.—Improvement in the demand for lap-welded steel tubes continues and orders now are running a little in excess of production. These make for a firmer tendency to prices. Observance of discounts on seamless tubes is close. Charcoal iron tubes are firm, although business could be better. Discounts are given on page 1553.

Spikes.—The market on spikes is firm at 2.25c., base, for standards and 2.50c., base, for small and boat and barge spikes. Current demands are light, but makers have a fair backlog of orders and the firmness of the bar market also makes for close adherence to quotations. The Baltimore & Ohio Railroad is inquiring for about 5000 kegs of standard spikes. Prices are given on page 1553.

Cold-Finished Steel Bars and Shafting.—There is a good demand for all sizes, particularly for screw stock, with the market firm at 2c., base, Pittsburgh, for carloads and 2.25c. for less carloads. The market derives most of its strength from the fact that hot-rolled bars are scarce and firm, rather than because of any shortage of cold-finished bars. Buyers generally are seeking supplies for prompt deliveries and usually find accommodation, although some extra shopping is necessary. Ground shafting is unchanged at 2.40c. base, mill, for carloads.

Hot-rolled Flats.—The market holds firm at a minimum of 2.25c., base, Pittsburgh, on hoops, bands and hot-rolled strips, but on the narrower widths of light gage material 2.50c. base is the more common quotation, especially on tonnages wanted promptly. The Trumbull Steel Co. has announced a minimum of 2.40c. base, Pittsburgh, on hot-rolled strips. The Pittsburgh Steel Co. has named the same price on hoops and bands. Prices on third quarter business in hot-rolled strips probably will be announced Thursday or Friday.

Coke and Coal.—The coke market has been somewhat excited in the past week by a report that the Pittsburgh Steel Co., which is planning to put into blast at an early date one of its furnaces, has paid $7 per ton or more for supplies of beehive oven coke.

There seems to be no basis in fact for such reports, as the company claims that it has not paid more than $6.35 and lately has been offered tonnages as low at $6. We still regard the quotable market on furnace grade for pickup tonnages, which are all that are available, at $6 to $6.50, and on foundry coke from $6.50 to $7. The coal market is soft for want of demand. Buyers are buying only small lots or are out of the market, pending the conference in Washington on Wednesday. Such business in Connellsville coal as has lately been done has been around $3 at mines, but there have been sales as low as $2.75, this being for very poor coal, which, however, forms the bulk of current offerings. Southern coal also is quotable at $2.75 to $3.

Old Material.—The heavy melting steel under negotiation at the time of our last report, amounting to 25,000 tons, was closed at $17.50 per gross ton, delivered. This sale establishes this market on that basis as none of the other users of heavy melting steel in this district is in the market at present. The sale reflects some weakening on the part of dealers, all of whom tried to obtain $18, and incidentally removed as a buyer the only steel company which recently had shown any interest in the market. The Baltimore & Ohio Railroad, W. S. Galloway, purchasing agent, Baltimore, will receive bids until noon, June 6, for 14 cars and 16,535 gross tons of old material; also on 3000 lb. of high-speed steel.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate as follows per gross ton:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh	$17.50
No. 1 cast, cupola size	18.50 to 19.00
Rerolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.	17.00 to 17.50
Compressed sheet steel	15.50 to 16.00
Bundled sheets, sides and ends	14.50 to 15.00
Railroad knuckles and couplers	18.00 to 18.50
Railroad coil and leaf springs	18.00 to 18.50
Low phosphorus standard bloom and billet ends	20.00 to 21.00
Low phosphorus plates and other grades	19.00 to 20.00
Railroad malleable	16.00 to 16.50
Iron car axles	26.00 to 27.00
Locomotive axles, steel	24.00 to 25.00
Steel car axles	17.50 to 18.00
Cast iron wheels	17.00 to 17.50
Rolled steel wheels	17.50 to 18.00
Machine shop turnings	13.50 to 14.00
Sheet bar crop ends	18.00 to 18.50
Heavy steel axle turnings	15.00 to 15.50
Short shoveling turnings	14.50 to 15.00
Heavy breakable cast	18.00 to 18.50
Stove plate	14.50 to 15.00
Cast iron borings	14.50 to 15.00
No. 1 railroad wrought	14.50 to 15.00
No. 1 busheling	14.00 to 15.00

Railroad Equipment Business

The Santa Fe has placed orders for 2000 automobile cars, of which 1000 were awarded to the Pullman Co. and 500 each to the American Car & Foundry Co. and the Standard Steel Car Co.

The St. Louis & San Francisco Railroad has ordered fourteen all-steel 70-foot passenger cars from the American Car & Foundry Co. Eight of these are coaches and six chair cars. They will be built in the St. Charles, Mo., plant.

The Baltimore & Ohio is expected in the market for rebuilding 3000 steel cars, and another road has about closed on upward of 1000 cars. At least one large railroad has not yet shown any interest and generally considerable car business is expected.

The Chicago Great Western is inquiring for repairs on 527 box cars. The Wabash will repair 500 box cars in its own shops and will let repairs on 200 additional. This road is also coming into the market for 2050 composite coal car bodies. It has let 750 hopper car bodies of 55 tons capacity to the Standard Steel Car Co. The Fort Smith & Western has awarded 125 center constructions to the Western Steel Car & Foundry Co.

The Illinois Central, as noted last week, is inquiring for 4000 freight car repairs. The distribution is as follows: 2300 box, 300 automobile and 1400 gondola cars.

EFFECT OF LOWER FREIGHT

Estimated Reduction in Costs of Making Pig Iron and Steel

PITTSBURGH, May 30.—The probable effect of the pending reduction in freight rates upon pig iron costs cannot be fully detailed at this time because there is no definite information as to the upper lake rail rates or what action will be taken by the lake carriers. The reduction anticipated by the Interstate Commerce Commission is 14 per cent of the Aug. 1, 1920, advance, which is equivalent to a reduction of 10 per cent from existing rates. The cut would mean 10c. per ton on ore from the lower lake docks to Valley furnaces and on the basis of two tons of ore for one ton of pig iron, this would mean a saving of 20c. on the ore. The saving on the coke required for a ton of pig iron would be 25c. and on the limestone 5c. This would make a total of 50c., to which is to be added 2c. to cover the reduction in switching charges on material in the ton of pig iron. The common expectation is that the upper lake rate will be reduced 25c. per ton or from $1, the present charge, to 75c. per ton, from the head of the lakes and again applying the rule of two tons of ore to the ton of pig iron, there would be a saving of 50c., while if the lake rate is cut 10c. per ton, as commonly expected, there will be a saving of 20c., making the total reduction $1.22.

As the situation stands now, pending a settlement of the upper rail and lake rates, there is an indicated saving in the rate already announced of 52c. on materials in the ton of pig iron and as the lowest cost of any merchant producers of basic pig iron prior to the recent advance in coke was $22.50, there is an indicated cost, figuring on the old basis, which included coke at $3 per ton at ovens, of $22. If there should be a reduction in ore prices of 50c. per ton or $1 in the quantity required for a ton of pig iron, the cost would be, still figuring on the old basis of coke, $21. This would be a step to further reduction when the upper rail and lake water rates were settled.

At the present time, however, coke is costing at least $3 per ton more than it did when the cost of $22.50 was established, and this more than counterbalances any benefit to be derived from the rate reduction. Moreover, in arriving at $22.50 as the cost of pig iron at Valley furnaces, an overhead of only $2.50 was charged and this is well below the average of merchant producers, some of whom have charges running as high as $4.50.

On Bessemer iron, the old basis of costs was $1.30 per ton over basic. The rate reduction, coming at this time when the pig iron market no longer is a liquidating proposition, means that prices are to be based strictly upon costs and that any decline from present levels must come from reductions in costs.

The savings in the production in a ton of steel as a result of lower freight rates varies considerably, depending upon the locality. In a general way, it was figured cost of laying down materials required in a ton of steel in this and nearby districts ranged from $8 to $8.50, and a straight 10 per cent cut would mean a saving of 80c. to 85c. on a ton of steel.

Licensed to Sell Mechanical Doubler

YOUNGSTOWN, May 30.—The Aetna Foundry & Machine Co., Warren, Ohio, has been licensed to manufacture and sell the independents a mechanical doubler in two designs, steel and roll types. It is claimed the machine eliminates the skilled doubler, making the operation merely a mechanical one.

The Chapman-Price Steel Co., Indianapolis, Ind., has awarded the contract to the Standard Engineering Co., Ellwood City, Pa., for equipment for an additional sheet mill which will give the company a complement of five. Designs for still another unit are being developed.

Chicago

Heavy Week in Steel—Freight Rate Reduction Disappointing

CHICAGO, May 30.

The freight rate reduction was disappointingly small. It has had the effect, however, of removing one element of uncertainty which influenced the policy of buyers. In one sense the small size of the rate cut is not unwelcome to sellers, as it offers little inducement to customers to delay further buying until the new tariffs go into effect.

In the steel market shipments are already so tardy that few requests for advancing deliveries have been received except from distant points. In the pig iron market, there is more of a propensity to hold back orders and specifications on this account. The supply of scrap which it was thought would be materially increased through the release of much country scrap which could not move under the present rates, will be affected only slightly.

Steel producers report another heavy week in new business and in specifications. In bars and structural shapes, local mills cannot give delivery before the close of the next quarter while the best shipment available on plates is six to eight weeks. Buyers desiring prompt material are finding it necessary to turn to mills further East.

Local mills are on about the same operating basis as a week ago. The merchant bar mill of the Minnesota Steel Co. at Duluth, however, is resuming operation this week. The two blast furnaces of this plant have been running since early in the month.

Pig Iron.—Buying is on a moderate scale and inquiries are fewer, particularly for prompt material. While the rate reduction, effective July 1, is small, it is thought that some business is being delayed on that account. Pig iron consumption, however, is steadily increasing, reports from practically all classes of foundries indicating larger melt. Notable among recent sales was 1000 tons of foundry for third quarter delivery to a Racine melter. A Michigan user has bought 500 tons of Southern foundry for third quarter at $18.50 base Birmingham. The new all-rail rate from Birmingham to Chicago will be $6 a ton, or only 67c. less than the present rate. A greater reduction had been expected. Charcoal inquiries are more numerous notwithstanding the recent advance. Several sales of silvery have been made at the new prices, among them 200 tons bought by a Michigan melter. On the whole, buyers seem to be reconciled to the present level of prices and are showing less resistance to the recent advances than they did when pig iron prices first commenced to stiffen early in the year. This change in attitude is no doubt explained by the fact that users are enjoying better business. The Zenith Furnace, Duluth, will be blown in about July 1.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago	$29.00
Northern coke, No. 1, sil. 2.25 to 2.75	$23.50 to 24.00
Northern coke, foundry, No. 2, sil. 1.75 to 2.25	23.00
Northern high phos	23.00
Southern No. 2	24.42 to 25.17
Malleable, not over 2.25 sil	23.00
Basic	23.00
Low phos. Valley furnace, sil. 1 to 2 per cent copper free	35.00
Silvery, sil. 8 per cent	37.82

Ferroalloys.—Several sales of ferromanganese ranging from 200 to 300 tons each have been closed at $67.50 base, New Orleans. The market is stiffer and an advance to $70 seaboard is looked for. Spiegeleisen is also stronger, with prices ranging from $46.50 to $47 delivered.

We quote 78 to 82 per cent ferromanganese, $75.90 to $80.40, delivered; 50 per cent ferrosilicon, $55, delivered; spiegeleisen, 18 to 22 per cent, $46.50 to $47, delivered.

Cast-Iron Pipe.—Pipe shops booked heavily in May and have considerable work ahead. Prices are stiffer, ranging from $36 to $37, Birmingham, for 6-in. and over. The National Cast Iron Pipe Co. will furnish 100 tons for Springfield, Ill. Chicago has let 570 tons to James B. Clow & Sons. Middletown, Ohio, has awarded 200 tons to the United States Cast Iron Pipe & Foundry Co. Three River Falls, Minn., takes bids on 100 tons May 31. Other work still pending includes 500 tons for Moline, Ill., and 1000 tons for Herrin, Ill.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., $49 to $50.10; 6-in. and above, $45.10 to $46.10; class A and gas pipe, $3 extra.

Bolts and Nuts.—The automobile manufacturers are heavy buyers, but railroad purchases are diminishing. The most encouraging feature of the market is the fact that farm implement makers are commencing to place sizable orders. In a single day last week, one bolt maker booked orders for 516,000 plow bolts, the major part of which came from one concern. For mill prices see finished iron and steel, f.o.b. Pittsburgh, page 1553.

Jobbers quote structural rivets, 3c.; boiler rivets, 3.10c.; machine bolts up to ¾ x 4 in., 60 and 10 per cent off; larger sizes, 60 off; carriage bolts up to ¾ x 6 in., 60 off; larger sizes, 50 and 5 off; hot pressed nuts, squares and hexagon tapped, $3.50 off; blank nuts, $3.75 off; coach or lag screws, gimlet points, square heads, 60 and 5 per cent off. Quantity extras are unchanged.

Structural Material.—Local mills are so heavily booked that on new business the buyer cannot hope for delivery much before the close of third quarter. As a result, those who require plain material for earlier shipment are placing their tonnage with Eastern mills at premium prices, 1.75c., Pittsburgh, not being uncommon. The position of local mills is exceedingly strong and another advance in their prices would not be surprising. Building activity is less brisk and it is notable that fewer large projects are being undertaken. The fact that slow delivery of plain material may prevent buildings of this type from getting under cover before winter is no doubt causing some of this work to be postponed. On the other hand, the larger fabricators are now fully engaged for a considerable period ahead, and others will no doubt get into a similar position as soon as the numerous jobs still pending have been let.

The mill quotation on plain material is 1.70c. to 1.80c., Chicago. Jobbers quote 2.48c. for plain material out of warehouse.

Semi-Finished Steel.—Sheet bars and billets have advanced $3 a ton, sheet bars being quoted at $35, Chicago, rerolling billets at $34, base, Chicago, and forging billets at $39, base, Chicago.

Plates.—The Inland Steel Co. is still able to offer plates for from six to eight weeks' delivery, but from other local sources no definite promise as to shipment can be obtained. Plates on which prompt shipment is desired are being placed with Eastern mills at as high at 1.75c., Pittsburgh. The market is exceedingly strong and another advance in prices is looked for. The steel for 2000 freight cars placed by the Santa Fe, calling for about 15,000 tons of plates, shapes and bars, will be furnished by the leading interest.

The mill quotation is 1.70c. to 1.80c., Chicago. Jobbers quote 2.48c. for plates out of stock.

Reinforcing Bars.—Dealers find it difficult to keep pace with the demand. Much pending work is still unlet and these are keeping the trade busily engaged with estimating. Awards include:

High school, Rockford, Ill., 150 tons, to Corrugated Bar Co.

Winona Apartments, Chicago, 120 tons, to Concrete Steel Co.

Arcade Building, Racine, Wis., 250 tons, to Calumet Steel Co.

Pike and Scott counties, Illinois, highway work, 900 tons, to LaClede Steel Co.

Pending business includes:

State capitol, Santa Fe, N. M., 130 tons.
Keenan Hotel, Fort Wayne, Ind., 150 tons.
Federal Reserve Bank, Minneapolis, Minn., 150 tons.
Fair store addition, Chicago, tonnage not estimated.

Bars.—The situation in soft steel bars is growing tighter every day with local mills booked three to four months. For early delivery, buyers must look to producers in other districts, as high as 1.75c., Pittsburgh, being paid. Business in bar iron is also considerably better with the market strong at 1.70c. to 1.75c., Chicago. This improvement is attributable in part, no

doubt, to a substitution of bar iron for soft steel by buyers accustomed to using the latter product. Hard steel bar mills have several weeks' work ahead on a single turn basis. Hard bars can still be bought at 1.60c., Chicago, however.

Mill prices are: Mild steel bars, 1.70c. to 1.80c., Chicago; common bar iron, 1.70c. to 1.75c., Chicago; rail carbon, 1.60c. mill or Chicago.

Jobbers quote 2.38c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.40c. for rounds and 3.90c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 2.38c. base. Hoops, 3.23c. Bands, 2.98c.

Sheets.—The local independent has advanced blue annealed $2 a ton to 2.50c., base, Pittsburgh, and black and galvanized $3 a ton to 3.30c. and 4.30c., base, Pittsburgh, respectively. This mill is able to make August delivery on most sizes, although hot weather may cripple output to the extent of delaying shipments beyond present estimates. The leading producer has not yet made any change in prices, although the announcement of an advance would not be surprising.

Mill quotations are 3.15c. to 3.30c. for No. 28 black, 2.40c. to 2.50c. for No. 10 blue annealed and 4.15c. to 4.30c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 38c. per 100 lb.

Jobbers quote blue annealed, 3.53c.; black, 4.30c.; galvanized, 5.30c.

Old Material.—Consumptive buying has slackened materially, but prices show little change, few recessions being more than 25c. a ton. This is probably explained by the fact that short interests are still covering against recent sales. On the other hand, the available supply of scrap is steadily increasing. Owing to the fact that many users are covered for a considerable period ahead, holders of scrap continue to offer their accumulations in the hope of liquidating before the market declines further. Increased manufacturing operations are also resulting in larger scrap production. Few observers, however, look for a sharp downward trend of prices. While a settlement of the coal strike may bring a reaction in the market inasmuch as it will remove the motive for substituting large quantities of scrap for hot metal in the open hearths, it is believed that the recovery will be prompt in view of the general improvement in business conditions. Railroad offerings include: The Illinois Central, 2200 tons; the Chicago, Milwaukee & St. Paul, 1200 tons; the Grand Trunk, 2500 tons; and the Michigan Central, the New York Central and the Big Four, blind lists.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

	Per Gross Ton	
Iron rails	$18.00 to	$18.50
Cast iron car wheels	18.00 to	18.50
Relaying rails	22.50 to	27.50
Rolled or forged steel car wheels	16.25 to	16.75
Steel rails, rerolling	15.00 to	15.50
Steel rails, less than 3 ft.	15.75 to	16.25
Heavy melting steel	14.50 to	15.00
Frogs, switches and guards cut apart	14.75 to	15.00
Shoveling steel	14.25 to	14.75
Drop forge flashings	10.50 to	11.00
Hydraulic compressed sheet	11.50 to	12.00
Axle turnings	12.00 to	12.50
	Per Net Ton	
Iron angles and splice bars	16.00 to	16.50
Steel angle bars	13.50 to	14.00
Iron arch bars and transoms	17.25 to	17.75
Iron car axles	22.00 to	22.50
Steel car axles	15.00 to	15.50
No. 1 busheling	11.00 to	11.50
No. 2 busheling	7.00 to	7.50
Cut forge	12.75 to	13.25
Pipes and flues	9.50 to	10.00
No. 1 railroad wrought	12.75 to	13.25
No. 2 railroad wrought	12.75 to	13.25
Steel knuckles and couplers	14.25 to	14.75
Coil springs	14.50 to	15.00
No. 1 machinery cast	16.00 to	16.50
No. 1 railroad cast	15.25 to	15.75
Low phos. punchings	13.50 to	14.00
Locomotive tires, smooth	12.25 to	12.75
Machine shop turnings	6.50 to	7.00
Cast borings	10.00 to	10.50
Stove plate	13.75 to	14.25
Grate bars	12.50 to	13.00
Brake shoes	12.75 to	13.25
Railroad malleable	15.00 to	15.50
Agricultural malleable	15.00 to	15.50

Wire Products.—Demand is not so pressing as in recent weeks, a fact which is accounted for in part, at least, by passing of the season for barbed wire, fencing and poultry netting. The volume of nail buying shows little change. The reduction in freight rates has resulted in the receipt of requests from distant points to hold up shipments until after July 1. Inasmuch as the mills are behind on deliveries, this is not an unwelcome development. For mill prices see finished iron and steel, f.o.b. Pittsburgh, page 1553.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, $3.10 per 100 lb.; No. 9 and heavier bright basic wire, $3.25 per 100 lb.; common wire nails, $3.25 per 100 lb.; cement coated nails, $2.75 per keg.

Rails and Track Supplies.—Roads continue to press the mills for deliveries of both rails and fastenings. New business in track supplies is also good, one maker having taken miscellaneous orders for 20,000 kegs of spikes and 15,000 kegs of bolts during the past week. Some large orders for steel wheels have been booked.

Standard Bessemer and open hearth rails, $40; light rails rolled from new steel, 1.50c., f.o.b. makers' mills.

Standard railroad spikes, 2.12c. to 2.25c., Pittsburgh; track bolts with square nuts, 3.12c. to 3.25c., Pittsburgh; tie plates, steel and iron, 1.85c., f.o.b. mill; angle bars, 2.40c., f.o.b. mill.

New York

Irregular Steel Buying, with Jobbing Trade Active—Coke Market Tight

NEW YORK, May 30.

Pig Iron.—The market is quiet and prices are firm. The coke situation is very unsatisfactory and is causing furnaces to be very cautious about taking on additional tonnages. The usual quotations on eastern Pennsylvania iron are now on a basis of $24.50 for No. 2 plain, while $25 is asked for No. 2X and $26 for No. 1. The minimum at Buffalo seems to be $23. Foreign iron has not appeared in this market, but the likelihood that it will be a factor here will probably prevent prices from advancing to the height that they would go if it were impossible to import any iron. A few requests to postpone shipments until the reduced freight rates become effective July 1 have been received.

We quote delivered in the New York district as follows, having added to furnace prices $2.52 freight from eastern Pennsylvania, $5.46 from Buffalo and $6.16 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25	$28.52
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	27.52
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	27.02
Buffalo, sil. 1.75 to 2.25	28.46
No. 2 Virginia, sil. 1.75 to 2.25	29.16

Coke.—The situation is tighter and reports from the miners' strike are not encouraging. Foundry coke can be contracted for at $5.25 to $5.50, ovens, but for prompt delivery $6.50 to $7 is asked and furnace coke is fully as high as foundry grades. By-product coke is quoted at $9 seaboard with freight to New Jersey points, $1 on the Erie and Lackawanna, $1.68 on the Pennsylvania and $2.24 on the Central of New Jersey.

Finished Iron and Steel.—Demand on the whole has dropped off somewhat, some steel sales representatives finding a business lull, which they regard as temporary. Buying has not yet fully broadened, some groups of steel consumers experiencing little of the general betterment. Less structural steel work came to light locally than has been the case for some weeks, but railroad car activity is still noteworthy with expectations that much more car buying is still to be expected. Some car business and fabricated steel work have been settled on which the details are lacking. Some sales of the heavy tonnage products have been made at the 1.70c., Pittsburgh, price, but 1.60c. is still easily available.

We quote for mill shipments, New York, as follows: Soft steel bars, plates and structural shapes, 1.98c. to 2.08c.; bar iron, 1.98c. On export shipments the freight rate from Pittsburgh to New York is 28.5c. per 100 lb. and the domestic rate is 38c.

Cast-Iron Pipe.—Activity continues and prices are exceedingly stiff. Some municipal buying is reported. One foundry in this district reports that it is filled up for four months at least. We quote per ton, f.o.b. New York, in carload lots, as follows: 6-in. and larger, $50.80; 4-in. and 5-in., $55.50; 3-in., $65.80, with $4 additional for Class A and gas pipe.

High Speed Steel.—The market is unchanged and producers continue to quote 75c. to 80c. per lb. for

18 per cent tungsten high speed steel, with special brands of some companies bringing up to 95c. per lb.

Ferroalloys.—Demand for ferromanganese is spasmodic and light. Sales have been only moderate in the last week and the largest inquiry noted is one for 500 tons for July-August delivery. Very little is heard of sales by domestic producers, the bulk of the business being taken by British importers at prevailing quotations. The higher grade of spiegeleisen, 19 to 21 per cent, has been advanced $1 per ton to $36, furnace, and it is stated that there is no more of the lower grade, 16 to 19 per cent available. Nothing is heard of any demand for manganese ore, quotations continuing nominal. Demand for 50 per cent ferromanganese continues confined to small lots for early delivery at prevailing quotations and the same is true of the ferrochromium market. Quotations are as follows:

Ferroalloys

Ferromanganese, domestic, seaboard, per ton	$70.00
Ferromanganese, British, seaboard, per ton	$67.50
Spiegeleisen, 16 to 19 per cent, furnace, per ton	$34.00
Spiegeleisen, 20 per cent	$36.00
Ferrosilicon, 50 per cent, delivered, per ton	$57.00 to $60.00
Ferrotungsten, per lb. of contained metal	40c. to 50c.
Ferrochromium, 6 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr., delivered	12c. to 14c.
Ferrovanadium, per lb. of contained vanadium	$3.00 to $3.50
Ferrocarbontitanium, 15 to 18 per cent, net ton	$200.00
Ferrocarbontitanium, 15 to 18 per cent, 1 ton to carloads, per ton	$220.00
Ferrocarbontitanium, 15 to 18 per cent, less than 1 ton, per ton f.o.b. Niagara Falls, N. Y.	$250.00

Ores

Manganese ore, foreign, per unit, seaboard	25c. to 26c.
Tungsten ore, per unit, in 60 per cent concentrates, nominal	$3.00 up
Chrome ore, basis 48 per cent Cr_2O_3, crude, per unit, Atlantic seaboard	40c. to 45c.
Molybdenum ore, 85 per cent concentrates, per lb. of MoS_2, New York	40c. to 45c.

Warehouse Business.—Most warehouses report that May has been as good and in some cases better than April. Prices are generally unchanged, but in black and galvanized sheets quotations are firmer. With the official schedule in this district at 4.35c. and 5.35c. per lb. base on black and galvanized, respectively, it is becoming increasingly difficult to obtain concessions from this price on lots of 25 bundles or more, although 4.20c. and 5.20c. per lb. still is being done. Wrought iron and steel pipe dealers report no change either in size of business or prices. Brass and copper warehouses, which have been receiving numerous orders from the manufacturers of radio telephone equipment, report that purchasing from this source has decreased to about one-half and greatest activity is now being shown by wire screening and the usual line of spring purchases. We quote prices on page 1580.

Old Material.—The market is quiet this week, prices continuing steady. Some dealers are inclined to predict a slight weakness, based upon the belief that the coal strike is approaching the end. Bethlehem and Jones & Laughlin have been the chief points of activity, but deliveries on recent purchases by Bethlehem are said to be drawing to a close and it is rumored that Bethlehem may come back into the market at a higher price. Prices throughout are unchanged in this district.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard	$10.00 to $10.50
Steel rails, short lengths, or equivalent	12.00 to 12.50
Rerolling rails	12.00 to 12.50
Relaying rails, nominal	27.00 to 28.00
Steel car axles	11.50 to 12.00
Iron car axles	19.00 to 20.00
No. 1 railroad wrought	11.00 to 11.50
Wrought iron track	12.00 to 12.50
Forge fire	7.50 to 8.50
No. 1 yard wrought, long	10.50 to 11.00
Cast borings (clean)	9.50 to 10.00
Machine-shop turnings	9.50 to 10.00
Mixed borings and turnings	9.50 to 10.00
Iron and steel pipe (1 in. diam., not under 2 ft. long)	9.50 to 10.00
Stove plate	10.00 to 10.50
Locomotive grate bars	10.75 to 11.25
Malleable cast (railroad)	10.00 to 10.50
Cast-iron car wheels	12.00 to 12.50

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast	$19.00 to $20.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	16.50 to 17.00
No. 1 heavy cast, not cupola size	13.50 to 14.00
No. 2 cast (radiators, cast boilers, etc.)	12.00 to 12.50

Philadelphia

Pig Iron Prices Show Upward Trend — Fair Sales of Plates

PHILADELPHIA, May 30.

Pig Iron.—A substantial volume of foundry iron business has been booked in the past week by a New Jersey furnace which recently came into blast, but other Eastern furnaces which are sold further ahead and cannot make such good deliveries have had a rather quiet week. One Eastern Pennsylvania furnace has withdrawn from the market for a week or two. A furnace which was offering No. 2 plain at $23.50 and No. 2X at $22, furnace, has advanced to $24.50 for No. 2 plain, $25 for No. 2X and $26 for No. 1X. Apparently this is about the minimum at which foundry iron can be obtained to-day. As high as $28, furnace, has been paid for No. 1X. Basic is also higher. A steel company which bought from 5000 to 7000 tons from two or three furnaces paid prices which varied from $25 to $25.50, delivered. A furnace has sold its entire stock pile of 4000 tons, a good deal of which was off-grade, to one consumer at $23.50, furnace. The same consumer refused to pay $19 for the same lot several weeks ago.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to $1.54 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	$25.26 to $26.32
East. Pa. No. 2X, 2.25 to 2.75 sil.	26.26 to 26.82
East. Pa. No. 1X	27.76 to 27.84
Virginia No. 2 plain, 1.75 to 2.25 sil.	27.74 to 28.24
Virginia No. 2X, 2.25 to 2.75 sil.	28.24 to 28.74
Basic delivery eastern Pa.	25.00 to 25.50
Gray forge	24.00 to 25.00
Malleable	25.50
Standard low phos. (f.o.b. furnace)	30.00
Copper bearing low phos. (f.o.b. furnace)	30.00

Ferroalloys.—Fair-sized sales of British ferromanganese have been made at $67.50, Atlantic Seaboard. Domestic alloy, though quoted at $70, seaboard, has also been sold to consumers who did not care to depend on somewhat slower delivery of the imported.

Semi-Finished Steel.—The demand continues fairly good and high prices are being paid. Mills have no difficulty in getting $35, Pittsburgh, for open hearth rerolling billets, $39 to $40 for forging quality, and $40, Pittsburgh, for wire rods.

Plates.—While there are no very large sales or inquiries for plates, the orders for small and medium-sized lots make up a very fair aggregate. The market is firmer at 1.60c. to 1.70c., Pittsburgh, and some mills do not care for business below 1.70c., while at least one maker is holding for a minimum of 1.75c., Pittsburgh.

Structural Material.—No very large structural jobs are pending and current sales are largely of small lots. Prices are firm at 1.60c. to 1.70c., Pittsburgh.

Bars.—The demand for steel bars continues surprisingly strong. One mill which is now able to make early deliveries has had no trouble in the past few days in obtaining 1.70c. and 1.75c., Pittsburgh, for fairly substantial lots. Bar iron is still quoted at 1.60c., Pittsburgh, for carload lots and at 1.70c. for less than carloads.

Warehouse Business.—Local jobbers have advanced prices for cold-finished steel bars 20c. per 100 lb. There are no other price changes. Sales of steel out of jobbers' stocks are about 70 per cent of what is considered a normal volume. We quote for local delivery as follows:

Soft steel bars and small shapes, 2.46c.; iron bars (except bands), 2.46c.; round edge iron, 2.55c.; round edge steel, iron finish, 1½ x ½ in., 2.55c.; round edge steel planished, 3.30c.; tank steel plates, ¼-in. and heavier, 2.56c.; tank steel plates, 3/16-in., 2.72c.; blue annealed steel sheets, No. 10 gage, 3.40c.; black sheets, No. 28 gage, 4.25c.; galvanized sheets, No. 28 gage, 5.25c.; square twisted and deformed steel bars, 2.50c.; structural shapes, 2.56c.; diamond pattern plates, ¼-in., 4.35c.; 3/16-in., 4.50c.; spring steel, 3.50c.; round cold-rolled steel, 3.20c.; squares and hexagons, cold-rolled steel, 3.70c.; steel hoops, No. 13 gage and lighter, 3.21c.; steel bands, No. 12 gage to 3/16-in., inclusive, 2.96c.; iron bands, 3.90c.; rails, 2.36c.; tool steel, 8c.; Norway iron, 5.50c.; toe calk steel, 4.50c.; tire steel, 2.65c.; planished tire steel, 3.40c.

Sheets.—Current sales of sheets for shipment during the remainder of this quarter are being made at a variety of prices, frequently $5 a ton above the nominal schedule of 2.40c. for blue annealed, 3.15c. for black and 4.15c. for galvanized, base, Pittsburgh. Independent mills and consumers alike are awaiting with interest the expected announcement of the American Sheet & Tin Plate Co. regarding third quarter prices.

Old Material.—Heavy demand for blast furnace turnings has again forced up prices of that grade of scrap, of which there is a scant supply. Otherwise the market is practically unchanged, but there is a strong undertone. We quote for delivery at consumers' works in this district as follows:

We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel	$15.00 to $16.00
Scrap rails	15.00 to 16.00
Steel rails, rerolling	17.00 to 17.50
No. 1 low phos., heavy 0.04 and under	21.00 to 22.00
Cast iron car wheels	17.00 to 18.00
No. 1 railroad wrought	17.00 to 17.50
No. 1 yard wrought	15.00 to 15.50
No. 1 forge fire	13.00 to 13.50
Bundled sheets (for steel works)	13.00 to 13.50
No. 1 busheling	14.50 to 15.00
No. 2 busheling	12.00 to 13.00
Turnings (short shoveling grade for blast furnace use)	13.50 to 14.00
Mixed borings and turnings (for blast furnace use)	13.50 to 14.00
Machine-shop turnings (for steel works use)	13.50 to 14.00
Machine-shop turnings (for rolling mill use)	13.50 to 14.00
Heavy axle turnings (or equivalent)	13.50 to 14.00
Cast borings (for steel works and rolling mills)	13.50 to 14.00
Cast borings (for chemical plants)	16.50 to 17.50
No. 1 cast	18.50 to 19.00
Railroad grate bars	14.50 to 15.00
Stove plate (for steel plant use)	15.00 to 15.50
Railroad malleable	13.00 to 14.00
Wrought iron and soft steel pipes and tubes (new specifications)	14.50 to 15.00
Shafting	19.00 to 20.00

Buffalo

BUFFALO, May 29.

Pig Iron.—Quotations of $23 base for foundry iron have been more frequent than last week. Less than 10,000 tons has been sold, much of this business having been handled by one seller whose stocks of piled iron have been ample and with one furnace in blast to keep production up. Inquiry is scattered and no large tonnages are engaging Buffalo agencies. In a total volume of 7500 tons inquired for, there were 25 separate requests. Notwithstanding the absence of relief in the fuel situation, one producer is contemplating blowing in another furnace which will give it four in blast. On basic $23 is quoted and the furnace company which has two stacks in blast, one on foundry and the other on basic, is using its basic production for its own needs, quoting $23 on scattered requests.

We quote f.o.b. per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil.	$23.00 to $24.00
No. 2X foundry, 2.25 to 2.75 sil.	22.50 to 23.50
No. 2 plain, 1.75 to 2.25 sil.	22.00 to 23.00
Basic	23.50
Malleable	22.00 to 23.00
Lake Superior charcoal	29.14

Finished Iron and Steel.—None of the local factors in the selling field is in any better shape in the matter of being able to take any of the business offered. Sellers of tubular products, wire and cold-finished material, are committing themselves for regular customers, but it is difficult to place business for bars, shapes and plates. Orders for these materials are taken only where they fit into rolling schedules. One agency has taken some bar business in bars for June rolling, but the whole sales situation is considered carefully before sellers commit themselves—on account of the fuel situation. One agency is quoting 1.60c. on the little bar business it is considering and another is quoting 1.70c. All quotations are made subject to immediate withdrawal without notice. The reduction in freight rates on heavy materials is disappointing to some of the sellers. Sheet business has been good and the local branch of a large independent is sold up for second quarter and not taking any business for third quarter. Wire and billet demand as reported by one company is sufficiently brisk to put all departments on a full time basis.

Warehouse Business.—Sheets are especially in good demand and improvement is noticed in the calls for plates. This, of course, arises with the continued refusal by mill agencies to quote on these materials. The general trend of merchant business is good.

We quote warehouse prices, f.o.b. Buffalo, as follows: Structural shapes, 2.65c.; plates, 2.65c.; soft steel bars, 2.55c.; hoops, 3.30c.; bands, 3.15c.; blue annealed sheets, No. 10, 3.55c.; galvanized steel sheets, No. 28, 5.40c.; black sheets, No. 28, 4.40c.; cold-rolled strip steel, 5.80c.; cold-rolled round shafting, 3.35c.

Old Material.—Prices on several commodities have stiffened and production of scrap is heavier. Mills accepting shipments of heavy melting steel are insisting on more rigid inspection and as a result much material bought some weeks ago has been rejected.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel	$16.75 to $17.00
Low phos., 0.04 and under	18.00 to 19.00
No. 1 railroad wrought	16.00 to 16.50
Car wheels	17.00 to 18.00
Machine shop turnings	10.50 to 11.00
Cast iron borings	12.50 to 13.00
Heavy axle turnings	14.00 to 14.50
Grate bars	14.00 to 14.50
No. 1 busheling	15.00 to 15.50
Stove plate	15.00 to 15.50
Bundled sheet stampings	11.50 to 12.00
No. 1 machinery cast	18.00 to 18.50
Hydraulic compressed	15.00 to 15.50
Railroad malleable	17.00 to 17.50

Boston

BOSTON, May 29.

Pig Iron.—Sales in this territory dropped to small proportions the past week, while prices had an upward trend. Buffalo furnace interests heretofore quoting on a $22 base have advanced $1 a ton, and no eastern Pennsylvania iron is now available at $23.50 furnace base, interests offering it having marked up quotations at least 50c. Other eastern Pennsylvania interests quoting on a $25 furnace base have temporarily withdrawn from the market with the intention of re-entering on a basis of $26, furnace, for No. 2X and $28 for No. 1X, the latter grade having grown scarce the past fortnight. Alabama iron is unchanged in price and practically no Virginia is yet obtainable. Sales for the week ran largely to Buffalo and Alabama No. 2X and No. 1X, July, August and September delivery, the aggregate being about 2600 tons. A textile machinery maker is in the market for 500 tons each of silicons 2.25 to 2.75, 2.75 to 3.25 and 3.25 to 3.75; and a car builder 100 tons each of low, intermediate and high silicon malleable; all lots for third quarter delivery. New England foundries have asked deferred shipments on a small tonnage only as a result of the coming reduction in freight rates.

We quote delivered at common New England points as follows, having added to furnace prices $4.06 freight from eastern Pennsylvania, $5.46 from Buffalo, $6.58 from Virginia and $10.66 from Alabama:

East. Pa., sil. 2.25 to 2.75	$28.56 to $29.56
East. Penn., sil. 1.75 to 2.25	28.06 to 29.06
Buffalo, sil. 2.25 to 2.75	28.96 to 29.96
Buffalo, sil. 1.75 to 2.25	28.46 to 29.46
Virginia, sil. 2.25 to 2.75	31.08
Virginia, sil. 1.75 to 2.25	30.58
†Alabama, sil. 2.25 to 2.75	29.66
†Alabama, sil. 1.75 to 2.25	29.16
*Alabama, sil. 2.25 to 2.75	26.67 to 28.90
*Alabama, sil. 1.75 to 2.25	26.17 to 28.90

†Figured on an all-rail rate. *Figured on a rail and water rate.

Warehouse Business.—Further expansion in the movement of iron and steel out of warehouses is in order. Prices gather firmness with the increasing weekly output, and the next move is upward, according to warehouse interests. The local bolt and nut market is 10 to 20 per cent higher.

Jobbers quote: Soft steel bars, $2.50½ per 100 lb. base; flats, $3.15½; concrete bars, $2.50 to $2.78; structural steel, $2.50½ to $2.60½; tire steel, $3.85 to $4.25; open-hearth spring steel, $4 to $5.50; crucible spring steel, $11.50; steel bands, $3.00½ to $3.53; hoop steel, $3.41½; cold rolled steel, $3.20 to $3.70; refined iron, $2.50½; best refined iron, $4.25; Wayne iron, $5.50; Norway iron, $5.50; plates, $2.65½ to $2.83; No. 10 blue annealed sheets, $3.48 per 100 lb. base; No. 28 black sheets, $4.65; No. 28 galvanized sheets, $5.65.

Coke.—By-product foundry coke makers strongly intimate that prices will be advanced on both spot and contract shipments early in June. The two producers are well sold ahead, not only for that month, but well into the third quarter. The past week witnessed an increase in shipments from ovens based on slightly larger aggregate foundry melts and a desire on the part of melters to have as large stocks on hand as possible, some uneasiness over the coal strike situation having been in evidence for the first time.

Old Material.—Business has grown spotty and collectively quieter. With the contraction in transactions, some weakening, especially in bids for mixed borings and turnings, is noted. Certain dealers are overbought on heavy melting steel, and as increased inquiry appears doubtful for the moment, they anticipate a lower market. Others, however, continue to move stock on eastern Pennsylvania and Pittsburgh district mill contracts. Chemical borings are difficult to move, even at concessions. Cotton ties continue in fair demand at around $6.50 shipping point, and a little better inquiry for No. 1 machinery cast is reported, including a few 100-ton lots, but actual sales are small at an average price of about $19.50 delivered.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast	$19.00 to $20.00
No. 2 machinery cast	17.00 to 18.00
Stove plate	14.50 to 15.00
Railroad malleable	17.00 to 17.50

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$10.25 to $11.00
No. 1 railroad wrought	11.00 to 12.00
No. 1 yard wrought	10.00 to 10.50
Wrought pipe (1 in. in diam., over 2 ft. long)	8.50 to 9.00
Machine shop turnings	7.50 to 8.00
Cast iron borings, rolling mill	7.50 to 8.00
Cast iron borings, chemical	10.00 to 10.50
Blast furnace borings and turnings	7.50 to 8.00
Forged scrap and bundled skeleton	7.00 to 8.00
Street car axles	12.50 to 13.00
Shafting	14.50 to 15.00
Rerolling rails	11.00 to 11.50

St. Louis

ST. LOUIS, May 29.

Pig Iron.—As is usual following a week of heavy buying, the pig iron market was rather quiet last week. Most of the business placed was for carloads to match grades, the largest order of the week being for 500 tons of Southern for a stove manufacturer. Buyers are eager to have the pig iron they have bought, and they insist upon car numbers, so that the shipments can be traced through. There is a scarcity of iron of high silicon, and it is difficult to place orders for material above 1.75 to 2.25 per cent. Some makers are refusing to sell iron with a guarantee of silicon over 2.25. The melt of pig iron in the district continues to increase, the Eighth Federal Reserve Bank reporting that the April melt was approximately 12¼ per cent greater than in March. Seven stove manufacturing interests report sales from 22 to 108 per cent larger in April than during the same month last year, while five farm implement manufacturers and distributors show sales from 30 to 104 per cent larger in April than in April, 1921. Pending inquiries include 300 tons of 2.25 to 2.75 silicon and 200 tons of 1.75 to 2.25 silicon foundry iron for an Evansville melter and 100 tons for a Kansas City concern. The market is firm at $23 Chicago for Northern iron and $18.50 to $19 Birmingham for Southern. All users of 50 per cent ferrosilicon in this district have contracted for their requirements for the remainder of the year.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices $2.80 freight from Chicago and $5.74 from Birmingham:

Northern foundry, sil. 1.75 to 2.25	$25.80
Northern malleable, sil. 1.75 to 2.25	25.80
Basic	25.80
Southern foundry, all rail, sil. 1.75 to 2.25	$24.24 to 24.74
Southern foundry, water and rail, sil. 1.75 to 2.25, f.o.b. St. Louis	22.74

Finished Iron and Steel.—Railroad requirements continue the center of interest to the iron and steel trade here. The Missouri, Kansas & Texas Railway is in the market for 800,000 tie plates, 300,000 being for 56 to 66-lb. rails and 500,000 for 85 to 90-lb. rails, the requisition involving about 2400 tons. The Missouri Pacific wants 2500 kegs of heat treated track bolts, while the Cotton Belt wants 320 wheels. Local fabricators are all busy working on jobs calling for from 75 to 300 tons of steel, but their requirements have been well taken care of for the present. Bids will be opened June 2 for the Federal Reserve building at Little Rock, involving 125 tons of reinforcing bars. Jobbers are still issuing specifications against bars bought on the old price of 1.40c. Pittsburgh. Jobbers bought heavily of sheets in anticipation of an advance, the market now being 4.30c. for galvanized, 3.30c. for black and 2.50c. for blue annealed, Pittsburgh.

For stock out of warehouse we quote: Soft steel bars, 2.47½c. per lb.; iron bars, 2.47½c.; structural shapes, 2.57½c.; tank plates, 2.57½c.; No. 10 blue annealed sheets, 3.62½c.; No. 28 black sheets, cold rolled, one pass, 4.30c.; cold drawn rounds, shafting and screw stock, 3.40c.; structural rivets, $3.09½ per 100 lb.; boiler rivets, $3.19½; tank rivets, 7/16 in. and smaller, 60 and 10 per cent off list; machine bolts, large, 60 per cent; small, 60 and 10 per cent; carriage bolts, large, 55-5 per cent; small, 60 and 10 per cent; lag screws, 60-5 per cent; hot pressed nuts, square or hexagon blank, $3.50; and tapped, $3.25 off list.

Coke.—Industries in the district are beginning to show some interest in the substitution of coke for coal. One local user is negotiating for 100 to 200 tons of coke daily. Many of the local office buildings are turning to coke, finding it more economical for their purpose than coal, and local by-product producers are getting added distribution through that source. Some users of coke are waiting for the reduction in freight rates to become effective before placing further orders, and this is especially true of the coal trade.

Old Material.—The old material market as a whole is very quiet. Consumers are not buying and with dealers well stocked melting steel is much easier. On the other hand, special steel grades are scarce, and a large short interest exists. Rails, including re-rollers, are being offered in large quantities and mills are well supplied with these grades. The Big Four has a large list and the Louisville & Nashville a smaller one this week.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton	
Old iron rails	$16.75 to $17.25
Steel rails, rerolling	14.25 to 14.75
Steel rails, less than 3 ft	15.00 to 15.50
Relaying rails, standard section	25.00 to 28.00
Cast iron car wheels	17.50 to 18.00
No. 1 railroad heavy melting steel	13.25 to 13.75
No. 1 heavy shoveling steel	12.50 to 13.00
Frogs, switches and guards, cut apart	14.00 to 14.50
Per Net Ton	
Heavy axle and tire turnings	9.50 to 10.00
Steel angle bars	12.75 to 13.25
Iron car axles	23.00 to 23.50
Steel car axles	16.50 to 17.00
Wrought iron bars and transoms	18.00 to 18.50
No. 1 railroad wrought	12.50 to 13.00
No. 2 railroad wrought	12.00 to 12.50
Railroad springs	15.00 to 15.50
Steel couplers and knuckles	15.00 to 15.50
Cast iron borings	8.50 to 9.00
No. 1 busheling	11.00 to 11.50
No. 1 railroad cast	15.50 to 16.00
Stove plate and light cast	12.75 to 13.25
Railroad malleable	12.75 to 13.25
Pipe and flues	8.00 to 8.50
Machine shop turnings	6.50 to 7.00

Birmingham

BIRMINGHAM, May 30.

Pig Iron.—Basic conditions affecting iron and steel markets, which have been reflected in the Birmingham district for the past two months in particular, continue in a sound state. These conditions would indicate an expansion in consumption—both immediate and future, for buyers have been insisting on fourth quarter bookings and several producing interests have met their wishes for round tonnages. For forward deliveries, producers have been asking and receiving $18 to $18.50 per ton f.o.b. cars furnace, for both foundry and basic iron. The marked feature of the market is its stability in price—a clear cut indication of its healthy tone. There have been no admitted shadings of the minimum price of $18 for forward deliveries; and on the other hand some interests refuse to quote a lower price than $18.50 per ton at the furnace. These fixed prices accentuate the trend and faith of buyers and sellers in a stable market, and consumers have evidently created the same tone with the consuming public. By

these signs the heretofore hand-to-mouth buying is gradually disappearing. The proposed reduction in freight rates has been received as a most welcome omen to stimulate further buying. Production has increased more than 50 per cent since January, and the number of furnaces in blast has increased from 10 to 21. By June 1st production will be within six to eight per cent of the normal active capacity of furnaces within the State—a splendid record and criterion of the trend of marked conditions. A comparatively small tonnage of this increase may be attributable to the pending coal strike in the Eastern and Central coal fields. The Gulf States Steel Co. is now operating on practically 100 per cent normal active capacity, and the Tennessee company at least 85 per cent of its normal active capacity—thus indicating that the steel industry of the district is making a splendid showing in domestic and foreign markets.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silicon 1.75 to 2.25	$18.00 to $18.50
Basic	18.00 to 18.50
Charcoal, warm blast	30.00 to 32.00

Cast Iron Pipe.—The cast iron soil pipe market continues to show improvement in demand, and prices are quoted at $55 per ton f.o.b. cars works. There has been an advance in the price of high pressure pipe, effective June 1 as follows: For lots of 100 tons and over, $37 base; for less than 100 tons $37.50 base. Until June 1 the base prices will be $35.50 to $36. The city of Atlanta, Ga., closed with the United States Cast Iron Pipe & Foundry Co., for 9,000 tons for sizes up to and including 48-in. This company expects to have its De Lavaud centrifugal pipe process in operation within the next 30 days.

Old Material.—The old material market, in sympathy with increased pig iron and steel business, has shown a decided improvement, especially for miscellaneous steel scrap. While the Gulf States Steel Co. is by far the largest consumer of miscellaneous steel scrap in the South, dealers are gradually finding a ready market throughout the South at foundries which are engaged in the manufacture of semi-steel castings.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails	$13.00 to $14.00
No. 1 steel	12.00 to 13.00
No. 1 cast	14.00 to 15.00
Car wheels	13.00 to 14.00
Tramcar wheels	12.00 to 13.00
Stove plate	12.00 to 13.00
Cast iron borings	6.00 to 7.00
Machine shop turnings	4.00 to 5.00

Cleveland

Fixing of Ore Prices Awaits Further Action in Regard to Freight Rates

CLEVELAND, May 29.

Iron Ore.—Ore rates from the mines to the upper lake docks were not affected by the 10 per cent rate cut made by the Interstate Commerce Commission, and there is still uncertainty as to when the reduced rates from the lower lake ports will go into effect. Consequently the naming of ore prices for the season, which was expected as soon as the rate decision was announced, is being delayed. It is expected that the situation will be cleared up this week. The rate decision did not cover rates on ore from the mines to upper lake docks, as it stipulated that the cut applied to rates that were increased in 1920. Rates on ore from the mines were not increased that year because of the sharp advance made in these rates in 1919. Consequently, if any reduction is made now, it must be made voluntarily by railroads. This year's ore prices will be affected by whatever reduction is made in the upper lake rates, as the shippers pay for the haul from the mines to the docks. A reduction of over 50c. per ton from last season's prices seems improbable, as ore firms feel that whatever reduction is made should be limited to about their saving in transportation costs. A meeting of the representatives of the Western railroads will be held in Chicago Wednesday to consider rates on ore from the mines and it is believed these railroads will agree to at least a 10 per cent reduction. A committee of ore men has been informally appointed to take the matter up with the Western roads and is endeavoring to secure a 10 per cent or greater reduction. The rate decision was disappointing to ore shipping and consuming interests in that it did not reduce the rates on the haul from mines to docks and in that it did not provide for the placing of the reductions on ore from mines to interior furnaces in effect earlier than July 1. Several ore men appeared before the ore, coal and coke committee of the Central Traffic Association in Pittsburgh Thursday and urged that the new rates be placed in effect at an earlier date than July 1. It was pointed out that if the reduction is not made before July 1 very little ore will be moved before that date and the movement during the latter part of the season will be so heavy that the railroad transportation facilities will be insufficient to handle the ore from the lower lake docks. The committee agreed to recommend to the railroad executives that the new ore rate be placed in effect at an earlier date and the matter was discussed at the meeting of the executives in New York Friday. It will be further considered at a meeting of the executives June 1. While no positive announcement has been made, it is expected that the new ore rates will be placed in effect June 10.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, $6.45; Old range non-Bessemer, 51½ per cent iron, $5.70; Mesabi Bessemer, 55 per cent iron, $6.20; Mesabi non-Bessemer, 51½ per cent iron, $5.55.

Pig Iron.—The market continues active, with a more general booking of forward delivery orders and a decline in prompt shipment business. Some of the furnaces are now making sales for the fourth quarter, although orders for that delivery so far have been light, most of the business being for the third quarter. The same quotations are being made for any delivery this year. The Ford Motor Co. has advised Ohio foundries, with which it has contracts, that it will not ship them any iron for Ford castings from June 1 to Sept. 1, and these foundries must secure the iron elsewhere. Buying during the week was mostly in small lots. However, a Cleveland foundry placed 2000 tons of foundry iron and a Michigan foundry 2000 tons of malleable, both purchases being for automobile work. One local interest reports sales during the week aggregating 8000 tons and another 9000 tons. Prices are firm and unchanged with $23 the ruling minimum quotation by lake furnaces for foundry and malleable iron. For Cleveland delivery local furnaces quote $24. The competition of Southern iron is apparently a factor in preventing further price advances on Northern iron. Southern iron is firm at $18.50, at which price small lot sales are reported. Low phosphorous iron has advanced $1 per ton, sales of lots aggregating several hundred tons being made at $34.

Quotations below are f.o.b. local furnace for Northern foundry iron, not including a 56c. switching charge. Other quotations except basic are delivered Cleveland, being based on a $1.96 freight rate from Valley points, a $3.36 rate from Jackson and a $6.67 rate from Birmingham:

Basic, Valley furnace	$25.00
Northern No. 2 fdy., sil. 1.75 to 2.25	$23.00 to 24.00
Southern fdy., sil. 1.75 to 2.25	25.17
Ohio silvery, sil. 8 per cent	33.86
Standard low phos., Valley furnace	34.00 to 35.00

Ferroalloys.—Spiegeleisen has advanced $1 per ton to $36 for 19 to 21 per cent. We note the sale of 150 tons before the advance at $34.

Finished Material.—The demand for finished iron and steel continues fairly heavy, the volume of business being about the same as during the previous two or three weeks. The pressure on the part of consumers for delivery is becoming stronger. Steel bars, plates and structural material are quoted at 1.60c. as a minimum price, but some independent mills that can make fairly good deliveries are booking considerable small lot business at 1.70c. Hoops and bands are firmer with 2.25c. the general minimum quotation and some mills are now quoting 2.40c. The structural market continues active. Another lake boat has been placed, the American Shipbuilding Co. having taken a contract for a 600-ft. freighter for W. H. Warner & Co. and other Cleveland interests. This will require 4500 tons of plates. A new blast furnace project has brought out an inquiry for 2000 tons of plates and structural material. The demand for reinforcing bars shows a decided improvement. While hard steel bars are gener-

ally quoted at 1.60c., this price might be shaded $1 per ton for immediate specifications.

Jobbers quote steel bars, 2.31c.; plates and structural shapes, 2.41c.; No. 9 galvanized wire, 3c.; No. 9 annealed wire, 2.50c.; No. 28 black sheets, 3.90c.; No. 28 galvanized sheets, 4.90c.; No. 10 blue annealed sheets, 3.15c. to 3.21c.; hoops and bands, 2.81c.; cold-rolled rounds, 3c.; flats, squares and hexagons, 3.50c.

Sheets.—The demand continues good. While third quarter prices have not been named, some mills are taking on additional tonnages at regular prices, some of which they will not be able to ship until after June.

Coke.—An Ohio blast furnace which was a recent purchaser of Indianapolis by-product coke has purchased 10,000 tons additional of the same coke for July shipment. Connellsville foundry coke is quoted at $6.25 to $7 per ton for prompt shipment, but the demand is light.

Old Material.—Blast furnace scrap was active during the week. The Struthers Furnace Co. is credited with the purchase of 10,000 tons of borings and turnings and the Otis Steel Co., purchased 2,000 tons. The latter business was placed at around $13,25 to $13.50 delivered. The activity has caused a price stiffening on these grades. The market is strong except on heavy melting steel, which is quiet. No buying by mills is reported, but Valley district steel plants are expected to come in the market early in June. Compressed steel and axle turnings have advanced. The New York Central Railroad will make awards on a blank scrap list June 1.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel	$15.25 to $15.50
Steel rails, under 3 ft	15.75 to 16.00
Steel rails, rerolling	16.00 to 16.50
Iron rails	14.00 to 15.00
Iron car axles	18.00 to 19.00
Low phosphorus melting	16.00 to 16.25
Cast borings	12.50 to 13.00
Machine shop turnings	11.75 to 12.00
Mixed borings and short turnings	12.50 to 13.00
Compressed steel	12.85 to 13.25
Railroad wrought	14.00 to 14.50
Railroad malleable	15.50 to 16.00
Light bundled sheet stampings	10.00 to 10.25
Steel axle turnings	13.00 to 13.50
No. 1 cast	17.00 to 17.50
No. 1 busheling	11.25 to 11.75
Drop forge flashings over 10 in	11.00 to 11.50
Drop forge flashings under 10 in	11.25 to 11.75
Railroad grate bars	14.00 to 14.50
Stove plate	14.00 to 14.50
Pipes and flues	11.00 to 11.50

MORE PIPE MILLS

Steel & Tube Co. of America Authorizes Extensions—Changes in Officers

CHICAGO, May 27.—The Steel & Tube Co. of America made a number of changes in its officers and directors at a meeting here yesterday, and at the same time authorized extensions to its properties and announced that the merger with other independents is still in doubt.

Approval was given to the construction of two additional butt weld pipe furnaces at Indiana Harbor, giving 100,000 tons additional capacity in finished pipe annually. An additional $6,000,000 of capital will be provided through the sale of common stock to existing stockholders.

H. H. Springford, an officer of the company until a year ago, when he became treasurer and assistant to the president of the Goodyear Tire & Rubber Co., was elected president to succeed Armin A. Schlesinger, who was made chairman of the executive committee. A. H. Beale, general superintendent at Indiana Harbor, was elected vice-president in charge of operations; F. F. Corby, general manager of sales, was made a vice-president; and C. F. Speth, assistant treasurer, was appointed treasurer vice A. A. Schlesinger. Frederick R. Wahl was made secretary, succeeding C. D. Caldwell. Clayton Mark continues as chairman of the board and Anson and Clarence Mark remain vice-presidents. New members elected to the board of directors include: Harrison Williams, Leonard Kennedy, Herbert H. Springford, Clinton S. Lutkins, Charles F. Fawsett, George P. Miller, Frank F. Corby, D. R. McLennan and W. M. L. Fiske.

San Francisco

SAN FRANCISCO, May 24.

Pig Iron.—The past fortnight has witnessed a good volume of business in pig iron, principally of foreign make. High prices on domestic material seemed to turn most buyers to other offerings, and it is reported that around 2000 tons of Belgian iron was sold for July-August delivery at San Francisco. The price was around $30, ex-ship. The foundry trade is taking this shipment, in small lots, for the most part. Moreover, approximately 2000 tons of English pig iron has been contracted for early July arrival at about the same price level as on the Belgian iron, namely, $30, ex-ship. This lot is for discharge at various Pacific Coast ports. It appears that such liberal buying was stimulated by the possibility of a higher market, and is not altogether indicative of a greatly increased consumptive demand.

Coke.—Under the new freight ruling, on shipments originating in West Virginia the proportional rate from New Orleans, St. Louis and Memphis will be $11.42 a ton, effective June 1; and from points other than those in West Virginia the rate will be $12 a ton. This new schedule seems to have been a factor in the placing of about 1000 tons of domestic coke for delivery after June 1. In addition to this, between 1500 and 2000 tons of English coke has been sold at an attractive price. The market on foreign material is ruling from $19 to $20 a ton for delivery at Pacific Coast ports.

Old Material.—There is little change in the general condition of scrap in this market, business being of a rather routine nature. Consumers are well supplied, in most cases, and their needs are not considerably greater than those of the past few months. The Pacific Coast Steel Co. is still operating only one open-hearth furnace out of six, and the other local makers are working on about the same basis.

Cincinnati

Trade Generally Pleased by Reduction in Railroad Rates

CINCINNATI, May 29.—The announcement of the Interstate Commerce Commission that freight rates would be reduced approximately 10 per cent on July 1 was received with satisfaction by the metal working industry here. While there was some disappointment expressed at the amount of the reduction, the general opinion seems to be that the reduction is at least a step in the right direction, and that it will have a stimulating effect on general business.

While it was feared that the announcement would result in a flood of requests for suspension of shipments until the new rates became effective, up to date nothing of this kind has occurred. The buying lately has been for prompt shipment, and has had nothing of a speculative nature about it, so that all materials on order are absolutely needed to take care of orders on the books of consumers.

While the new schedules have not been worked out by railroad traffic bureaus, the new tariffs are expected to be in the hands of shippers by Wednesday of this week. The new rates on pig iron from the various producing districts to Cincinnati territory will be approximately as follows:

Ironton, Jackson and Ashland	$2.27
Birmingham, Ala.	4.05
Toledo	2.64
Cleveland	3.53
Valley points	3.65
Chicago	3.15

The rate on steel products shipped from Pittsburgh district will be reduced from 32c. to approximately 29c. per 100 lb.

On coke no schedules have been worked out, but it is expected that these will be approximately $3.53 per ton from Connellsville district; $2.80 from Pocahontas and New River fields; $2.70 from Wise County and $2.20 from Ashland, Ky.

Pig Iron.—The market was quiet during the week, the sales ranging from carload lots to 200 tons. The

price situation, however, is very firm and Southern iron is now at an $18.50 Birmingham minimum. Northern irons are unchanged, Ironton-Ashland district producers quoting $22.50 to $23, Lake furnaces $22 to $23 and Chicago district stacks $23. The largest sale reported during the week was one of 400 tons of Southern iron to a Kentucky melter on the basis of $17.50, Birmingham. This producer has since advanced its price to $19. There are few inquiries out, the largest being for 500 tons from an Evansville, Ind., melter. A South Bend melter is also inquiring for 500 tons of Northern and a Michigan melter for 400 tons. Furnaces are pretty well sold up for second quarter, and some of the Southern furnaces have booked considerable tonnages for third quarter and last half. With freight rate announced for July 1 it is expected that contracting for third quarter requirements will be given a stimulus, but the bulk of the business now being placed continues to be for prompt shipment. Tuscaloosa furnace went out for repairs last week and will be inactive for six weeks. Milton silvery furnace will blow in this week.

Based on freight rates of $4.50 from Birmingham and $2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	$23.00
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	23.50
Ohio silvery, 8 per cent	35.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	25.02
Basic Northern	25.02
Malleable	25.52

Finished Material.—The demand for finished material continues fairly heavy and during the week several orders of 500 tons and over were booked by independent mills. Prices generally on hot rolled products rule at 1.60c., but some mills, for early shipment, are asking and getting 1.70c. There is also a fair demand for iron bars, which are being substituted for steel bars on account of the difficulty in securing prompt shipment of the latter. A number of carload orders of iron bars were booked on the basis of 1.65c. Chicago. Specifications on tin plate orders are rather slow at the present time, and it is said that the year's business will hardly come up to expectations, as canners are rather backward in placing orders. There are reports that tin plate has been offered at around $4.50 per base box, but these rumors cannot be confirmed. The demand for nails and wire products continues good, and it is expected that advances will be made shortly in prices of all products. Sheets are very eagerly sought and carload lots are being regularly booked by a number of mills at 3.40c. to 3.50c. for black and 4.40c. to 4.50c. for galvanized. While the regular price on automobile body sheets remains at 4.50c., in some cases premiums as high as $15 per ton have been offered for prompt shipment. Auto seconds are also in brisk demand and are commanding the same price as prime sheets. Sheet mills in various parts of the country are experiencing difficulty in securing sufficient help to run their plants at capacity. Up to this time, no bookings for third quarter have been made, but it is expected that the American Sheet & Tin Plate Co. will open its books this week for third quarter and that independent mills will make the same prices. In the structural field there have been no awards of consequence. Fabricators are having some difficulty in securing plain material and an inquiry for 500 tons, mentioned in last week's report, has not as yet been placed.

Warehouse Business.—The demand for steel products for immediate shipment is very heavy at the present time, and local jobbers' stocks are dwindling fast. Reinforcing bars are moving in heavy volume and the same can be said of nails and other wire products. Jobbers of sheets report the past several weeks as running well ahead of any similar period for many months. No further price changes have been made, but it is expected that with higher prices being quoted by mills local warehouse prices will be advanced correspondingly.

Jobbers quote: Iron and steel bars, 2.75c. base; hoops and bands, 3.35c. base; shapes and plates, 2.85c. base; reinforcing bars, 2.82½c. base; cold-rolled rounds, 3.35c. base; flats, squares and hexagons, 3.85c. base; No. 10 blue annealed sheets, 3.60c.; No. 28 black sheets, 4.50c.; No. 28 galvanized sheets, 5.50c.; No. 9 annealed wire, $2.70 per 100 lb.; common wire nails, $2.85 per keg, base.

Tool Steel.—The demand for tool steel is heavier now than it has been at any time within the past two years. The increasing manufacturing operations and depleted condition of stocks are responsible for the better business now being booked. A reduction of 5c. per pound has been made in high speed steel, which is now quoted at 75c. per lb. for 18 per cent tungsten.

Coke.—The market during the past week showed fair activity, and while the orders consisted mostly of one and two carloads, the aggregate tonnage placed was the largest of any week for the past two months. Prices are holding steady, and the advancing tendency is not so much in evidence. It is expected that some plan of Government control of coal prices will be put into effect on June 1, as Secretary Hoover has invited the operators of the country to meet in Washington on May 31 to discuss the situation. It is reported that many West Virginia operators are favorably disposed toward Government regulation of prices. On the other hand, there are some who believe that regulation will be unnecessary. The demand for coal in this market is reported to be satisfied, and some speculators are reported to have been hard hit when prices slumped off from 50c. to $1 per ton during the latter part of the week. Coke prices are unchanged, Connellsville foundry coke being quoted at $5.50 for the remainder of the year; New River at $7.50 for prompt shipment; Wise County at $6, and by-product coke, for June shipment, at $7, Connellsville basis.

Old Material.—The demand for scrap materials has been pretty well satisfied in the Cincinnati district, and the market is quiet. Most of the dealers are shipping to other districts. A sale of a heavy tonnage of steel is reported to a Pittsburgh independent steel producer at a price 50c. under the market of one week ago. Consumers of scrap are specifying on their inquiries that they are to receive any advantages from reduced freight rates in cases where delivered prices are quoted. The price situation in the local market remains unchanged, but a softer tendency is noted.

We quote dealers' buying prices, f.o.b. cars:

Per Gross Ton		
Bundled sheets	$8.00 to	$8.50
Iron rails	13.50 to	14.00
Relaying rails, 50 lb. and up	26.50 to	27.00
Rerolling steel rails	12.00 to	12.50
Heavy melting steel	12.50 to	13.00
Steel rails for melting	13.00 to	13.50
Car wheels	14.00 to	14.50
Per Net Ton		
No. 1 railroad wrought	11.00 to	11.50
Cast borings	8.00 to	8.50
Steel turnings	7.00 to	7.50
Railroad cast	14.00 to	14.50
No. 1 machinery	16.00 to	16.50
Burnt scrap	9.50 to	10.00
Iron axles	18.00 to	18.50
Locomotive tires (smooth inside)	11.00 to	11.50
Pipes and flues	6.50 to	7.00

Atlas Crucible Steel and Electric Alloy Companies Merged

YOUNGSTOWN, May 30.—Plans for the merger of the Atlas Crucible Steel Co., Dunkirk, N. Y., and Electric Alloy Steel Co., Youngstown, have been completed and will be submitted to directors this week for approval. The arrangements provide for immediate plant extensions at Dunkirk, considerably increasing the Atlas company's productive capacity and also plant extensions at the Charleroi, Pa., plant of the Electric Alloy Steel Co. With these enlargements, the capacity of the merged interest for quality production of alloy steels will be second largest in this country. The present combined capacity of the companies is 40,000 tons yearly. The headquarters of the consolidation will be at Dunkirk, and the Youngstown offices of the Electric Alloy Steel Co. will be discontinued.

An additional plant is projected at Niles, Ohio, the Atlas company operates a works at Welland, Ont., in addition to its Dunkirk plant. The merger plan contemplates the retention of Louis J. Campbell, president of the Youngstown company, as chairman of the board of directors of the new concern, and Arthur H. Hunter, president of the Atlas company, as president. The Atlas company was formed in 1912 and in 1918 acquired by purchase the Atlas Drawn Steel Co. It also owns the Canadian Atlas Crucible Steel Co.

British Iron and Steel Market

America Still Buying Cleveland and Scotch Foundry Iron—Improved Export Inquiry—Tin Plate Firmer—Continental Quotations

(By Cable)

LONDON, ENGLAND, May 29.

Labor disputes in engineering trades are unsettled.

Pig iron generally is dull. Export buying has decreased but American purchases continue, including both Cleveland and Scotch foundry iron.

There is improved export demand for finished steel, including Continental inquiries for shipbuilding material for forward shipment, but makers generally are not keen to quote ahead. Scottish re-rolled bars are offered at £9 10s. (1.88c. per lb.) delivered.

Belgian competition is increasing, on account of decreased German purchases. Belgian merchant bars are offered at £8 15s (1.73c. per lb.) delivered Midlands. Continental business is improving. India has bought plates and merchant bars; wire nails have been sold to Shanghai; Singapore is inquiring for merchant bars. Belgian beams are quoted by merchants at £7 6s. (1.45c. per lb.), by works, as per table.

Tin plate is firmer on increased general buying and clearance of second-hand parcels. Good sales have been made, for June and July shipment, at 19½s. ($4.33) basis, f. o. b. Makers generally are anticipating higher values. Portugal is buying good quantities to the usual specifications, and further business is pending. "FCBY's" are quoted at 37½s. to 38s. ($8.33 to $8.44) hooped, f. o. b. There is a moderate demand from the Far East. The home trade is buying odd sizes at 19¼s. ($4.27), f. o. b., and wasters at 17s. ($3.77) f. o. t. Substantial inquiry for oil sizes is expected shortly.

Galvanized sheets are quiet. Black sheets to Indian specifications are held at £11 7½s. (2.26c. per lb.), f. o. b.

We quote per gross ton, except where otherwise stated, f. o. b. maker's works, with American equivalent figured at $4.44 per £1, as follows:

Durham coke, delivered	£1	7½s.	to	£1	8s.	$6.11	to $6.22
Cleveland No. 1 foundry	4	15				21.09	
Cleveland No. 3 foundry	4	10				19.98	
Cleveland No. 4 foundry	4	7½				19.43	
Cleveland No. 4 forge	4	2½	to	4	5	18.32	to 18.87
Cleveland basic	4	10				19.98	
East Coast mixed	4	15	to	4	16	21.09	to 21.21
Ferromanganese	15	0				66.60	
Ferromanganese*	14	10	to	14	15	64.38	to 65.49
Rails, 60 lb. and up	7	17½	to	9	10	34.97	to 42.18
Billets	7	0	to	8	0	31.08	to 35.52
Sheet and tin plate bars, Welsh	7	7½				32.75	
Tin plates, base box	0	19½	to	0	19¾	4.33	to 4.39
						C. per Lb.	
Ship plates	9	5	to	10	10	1.83	to 2.08
Boiler plates	13	10	to	14	0	2.68	to 2.78
Tees	9	10	to	11	0	1.88	to 2.18
Channels	8	15	to	10	5	1.73	to 2.03
Beams	8	10	to	10	0	1.68	to 1.98
Round bars, ¾ to 3 in.	9	10	to	10	10	1.88	to 2.08
Galvanized sheets, 24 g.	15	15	to	16	0	3.12	to 3.17
Black sheets	12	0	to	12	5	2.38	to 2.43
Steel hoops	12	0	&	12	5*	2.38	& 2.43*
Cold rolled steel strip, 20 g.	23	2½				4.66	
Cotton ties, Indian specifications	15	0				2.97	

*Export price.

Continental Prices, All F.O.B. Channel Ports, Delivery as Specified

No. 3 foundry pig iron:							
Belgium, June	£4	12½s.	to	£4	15s.	$20.54	to $21.09
Luxemburg, June	4	12½	to	4	15	20.54	to 21.09
France, June	4	12½	to	4	15	20.54	to 21.09
Basic pig iron:							
Luxemburg, June	4	6	to	4	7	19.09	to 19.31
Billets:							
Luxemburg, June	6	5				27.75	
Lorraine, June	6	5				27.75	
Wire nails (basis):							
Germany, August	0	14½				3.22	
Merchant bars:						C. per Lb.	
Belgium, June, July	7	15				1.54	
Luxemb'g, June, July	8	0				1.59	
Germany, June, July, Aug.	8	0	to	8	15	1.59	to 1.73
France, June, July, Aug.	8	0	to	8	15	1.59	to 1.73
Joists (beams):							
France, June, July	7	15	to	8	0	1.54	to 1.59
Belgium, June, July	7	7½	to	7	15	1.46	to 1.54
Luxemb'g, June, July	7	5	to	8	0	1.44	to 1.59
Large angles:							
Belgium, June, July, Aug.	7	12½	to	7	15	1.51	to 1.54
3/16-in. plates:							
Germany, July, Aug.	9	5				1.83	
Belgium, June, July	8	0	to	8	5	1.59	to 1.64
No. 8 gage wire:							
Belgium, June, July	14	10				2.87	

FABRICATED STEEL BUSINESS

Bridge and Building Awards and Tonnages Pending at Leading Centers

Awards for fabricated steel work the past week were as follows:

Warehouse, H. T. Potts & Co., Philadelphia, 750 tons, to the Phoenix Bridge Co.

Warehouse for Concrete Steel Co., Camden, N. J., 300 tons, to the Belmont Iron Works.

Power house, State Hospital, Danville, Pa., 500 tons, to McClintic Marshall Co.

Residence, East Seventy-first Street, New York, 175 tons, to Eidlitz & Ross.

Eighteen-story apartment, 104th Street and Broadway, 1000 tons, to Alfred E. Norton, Inc., New York.

Francis Marion Hotel, Charleston, S. C., general contract to John W. Cowper Co., 550 tons, to McClintic Marshall Co.

Highway bridge, Raymond, Wash., 310 tons, to Penn Bridge Co.

Ordnance Storage Building, No. 368, for the U. S. Bureau of Yards and Docks, Bremerton, Puget Sound, 290 tons, to the Shoemaker-Satterthwait Bridge Co., and not to McClintic Marshall Co., as incorrectly reported last week.

State of California bridge over Cuyama River, near Santa Maria, 126 tons, to McClintic Marshall Co.

Illinois Central Railroad, signal bridges, 123 tons, to Kenwood Bridge Co.

Moreland Court Apartment, Cleveland, 300 tons, to King Bridge Co.

Cleveland Trust Co. branch bank, 100 tons, to King Bridge Co.

Ward Baking Co., Youngstown, Ohio, 1200 tons, to American Bridge Co.

Transmission towers for Detroit Edison Co., Detroit, 1500 tons, to American Bridge Co.

Inspiration Copper Co., Inspiration, Ariz., trestle work, 150 tons, to Wisconsin Bridge & Iron Co.

Van Buren Garage, Milwaukee, addition, 100 tons, to Milwaukee Bridge Co.

Nash Motors Co., sheet metal and body shop at Milwaukee works, 400 tons, to Worden-Allen Co. (previously reported at 200 tons).

Michigan Smelting Co., Houghton, Mich., trestle, 125 tons, to Worden-Allen Co.

Rundle Mfg. Co., Milwaukee, addition to foundry, 100 tons, to Worden-Allen Co.

Fresh fabricated steel projects have appeared as follows:

Anchorages for Delaware bridge between Camden and Philadelphia, 2400 tons, including eye-bar construction, bids taken May 31.

North High School, Columbus, Ohio, 600 tons, bids close June 16.

Dam No. 32, Ohio River, unstated tonnage, bids close June 19.

Dam No. 34, Ohio River, unstated tonnage, bids close June 19.

Yawman & Erbe, new buildings, Rochester, general contract to John W. Cowper Co., Inc., Buffalo, N. Y.

Nebraska State capitol, Lincoln, 3000 to 4000 tons.

Clark Building, Peoria, Ill., 700 tons.

Federal Reserve Bank building, Little Rock, Ark., 200 tons.

Federal Reserve Bank, superstructure, Minneapolis, Minn., 1600 tons, bids in.

Euclid and Seventy-ninth Building, Cleveland, 500 tons, bids taken.

Ward Baking Co., Cleveland plant, 125 tons, bids taken.

North and South high schools, Columbus, Ohio, 400 tons.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Plates

Sheared, tank quality, base, per lb.....1.60c. to 1.75c.

Structural Material

Beams, channels, etc.....1.60c. to 1.75c.

Iron and Steel Bars

Soft steel bars, base, per lb.....1.60c. to 1.75c.
Refined iron bars, base, per lb.....2.10c. to 2.20c.

Hot-Rolled Flats

Hoops, base, per lb.....2.25c. to 2.50c.
Bands, base, per lb.....2.25c. to 2.50c.
Strips, base, per lb.....2.25c. to 2.50c.

Cold-Finished Steels

Bars and shafting, base, per lb.....2c.
Strips, base, per lb.....3.75c. to 4.00c.

Wire Products

Nails, base, per keg.....$2.40 to $2.50
Bright plain wire, base, per 100 lb..... 2.25
Annealed fence wire, base, per 100 lb..... 2.25
Galvanized wire, base, per 100 lb..... 2.75
Galvanized barbed, base, per 100 lb..... 3.05 to 3.15
Galvanized staples, base, per keg..... 3.05 to 3.15
Painted barbed wire, base, per 100 lb..... 2.55 to 2.65
Polished staples, base, per keg..... 2.55 to 2.65
Cement coated nails, base, per count keg..... 1.90 to 2.00
Woven fence, carloads.....70½ per cent off list

Bolts and Nuts

Machine bolts, small, rolled threads.65, 10 and 5 per cent off list
Machine bolts, small, cut threads.....65 and 5 per cent off list
Machine bolts, larger and longer.....65 and 5 per cent off list
Carriage bolts, ⅜ x 6 in.:
Smaller and shorter, rolled threads..65 and 5 per cent off list
Cut threads .....60 and 5 per cent off list
Longer and larger sizes.....60 and 5 per cent off list
Lag bolts .....65 and 10 per cent off list
Plow bolts, Nos. 1, 2 and 3 heads....50 and 10 per cent off list
Other style heads.....20 per cent extra
Machine bolts, c.p.c. and t. nuts, ⅜ x 4 in.:
Smaller and shorter.....60 per cent off list
Larger and longer sizes.....60 per cent off list
Hot pressed square or hex. blank nuts.....$4.75 off list
Hot pressed nuts, tapped.....$4.75 off list
C.p.c. and t. sq. or hex. nuts, blank.....$4.75 off list
C.p.c. and t. sq. or hex. nuts, tapped.....$4.75 off list
Semi-finished hex. nuts:
9/16 in. and smaller, U. S. S.....75, 10 and 5 per cent off list
Small sizes, S. A. E.....80 and 2 tens per cent off list
S. A. E. ⅝ in. and larger.....80 and 5 per cent off list
Stove bolts in packages.....80, 10 and 5 per cent off list
Stove bolts in bulk.....80, 10, 5 and 2½ per cent off list
Tire bolts .....65 and 5 per cent off list
Track bolts in carloads.....3.00c. to 3.25c. base
Track bolts, less than 200 kegs.....3.50c. to 3.75c. base

Upset Square and Hex. Head Cap Screws

½ in. and under.....80 and 10 to 80, 10 and 10 per cent off list
9/16 in. to ¾ in.....80 and 10 to 80, 10 and 10 per cent off list

Upset Set Screws

½ in. and under.....80, 10 and 5 to 85 per cent off list
9/16 in. to ¾ in.....80, 10 and 5 to 85 per cent off list

Milled Square and Hex. Cap Screws

All sizes .....75 and 10 to 80 per cent off list

Milled Set Screws

All sizes .....70, 10 and 10 per cent off list

Rivets

Large structural and ship rivets, base per 100 lb.....$2.25
Large boiler rivets, base per 100 lb..... 2.35
Small rivets .....65 and 10 to 70, 10 and 10 off list

Track Equipment

Spikes, 9/16 in. and larger, base, per 100 lb.....$2.25
Spikes, ½ in. and smaller, base, per 100 lb..... 2.50
Spikes, boat and barge, base, per 100 lb..... 2.50
Track bolts, base, per 100 lb..... 3.00
Tie plates, base, per 100 lb..... 1.75
Angle bars, base, per 100 lb..... 2.40

Welded Pipe

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛	54½	28	¼ to ⅜.....	+ 3½	+22½
¼ to ⅜.....	60	33½	½	36½	18½
½	65	50½	¾	42½	27½
¾	69	56½	1 to 1½.....	44½	29½
1 to 3.....	71	58½			

Lap Weld

2	64	51½	2	39½	25½
2½ to 6.....	68	55½	2½ to 6.....	42½	29½
7 to 8.....	65	51½	7 to 12.....	40½	27½
9 to 12.....	64	50½			

Butt Weld, extra strong, plain ends

⅛	50½	33	¼ to ⅜.....	+ 4½	+37½
¼ to ⅜.....	56	38½	½	35½	23½
½	62	50½	¾	42½	28½
¾	67	55½	1 to 1½.....	44½	30½
1 to 1½.....	69	57½			
2 to 3.....	70	58½			

Lap Weld, extra strong, plain ends

2	62	50½	2	40½	27½
2½ to 4.....	66	54½	2½ to 4.....	43½	31½
4½ to 6.....	65	53½	4½ to 6.....	42½	30½
7 to 8.....	61	47½	7 to 8.....	35½	23½
9 to 12.....	55	41½	9 to 12.....	30½	18½

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 and 2½ per cent.

Boiler Tubes

Lap Welded Steel		*Charcoal Iron*	
1¾ in.	26½	1½ in.	5
2 to 2¼ in.....	41	1¾ to 1⅞ in.....	15
2½ to 3 in.....	52	2 to 2¼ in.....	26
3¼ to 13 in.....	57	2½ to 3 in.....	30
		3¼ to 4½ in.....	32

To large buyers of steel tubes a supplementary discount of 5 per cent is allowed.

Standard Commercial Seamless Boiler Tubes

Discounts on cold-drawn or hot-rolled tubes in carload lots, f.o.b. Pittsburgh, follow:

1 in.	63	2½ and 2¾ in.....	46
1¼ and 1½ in.....	55	3 in.	50
1¾ in.	36	3¼ to 4 in.....	55
2 and 2¼ in.....	42	4¼ in. to 5 in.....	47

Less carloads, 4 points less. Add $8 per net ton for more than four gages heavier than standard. No extras for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be sold at mechanical tube list and discount. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Tin Plate

Standard cokes, per base box.....$4.75

Terne Plate

(Per package, 200-lb.)

8-lb. coating	$9.30	25-lb. coating I. C.....$14.25	
8-lb. coating I. C.....	9.60	30-lb. coating I. C.....	15.25
15-lb. coating I. C.....	11.80	35-lb. coating I. C.....	16.25
20-lb. coating I. C.....	13.00	40-lb. coating I. C.....	17.25

Sheets

Blue Annealed

Nos. 9 and 10 (base), per lb.....2.40c.

Box Annealed, One Pass Cold Rolled

No. 28 (base), per lb.....3.15c.

Galvanized

No. 28 (base), per lb.....4.15c.

Tin-Mill Black Plate

No. 28 (base), per lb.....3.15c.

Manufacturers have pamphlets, which can be had upon application, giving price differentials for gage and extras for length, width, shearing, etc.

Freight Rates

All rail freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic	$0.36	Buffalo	$0.295	Kansas City	$0.815	Pacific Coast	$1.665
Philadelphia, export	0.265	Cleveland	0.24	Kansas City (pipe)	0.77	Pac. Coast, ship plates	1.335
Baltimore, domestic	0.35	Detroit	0.325	St. Paul	0.665	Birmingham	0.765
Baltimore, export	0.255	Cincinnati	0.325	Omaha	0.815	Memphis	0.43
New York, domestic	0.38	Indianapolis	0.345	Omaha (pipe)	0.77	Jacksonville, all rail	0.555
New York, export	0.285	Chicago	0.28	Denver	1.35	Jacksonville, rail and water	0.46
Boston, domestic	0.405	St. Louis	0.475	Denver (wire products)	1.415	New Orleans	0.57
Boston, export	0.285						

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, $1; wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2½c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

NON-FERROUS METALS

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Straits Tin	Lead		Zinc	
May	Lake	Electrolytic*	New York	New York	St. Louis	New York	St. Louis
24.....	13.87½	13.62½	31.00	5.70	5.45	5.55	5.20
25.....	13.87½	13.62½	31.12½	5.70	5.45	5.55	5.20
26.....	13.87½	13.62½	31.25	5.70	5.45	5.60	5.25
27.....	13.87½	13.62½	....	5.70	5.45	5.60	5.25
29.....	13.87½	13.62½	31.25	5.75	5.45	5.60	5.25

*Refinery quotation.

New York

NEW YORK, May 29.

The markets are all moderately active and prices are steady to firm. Prices of copper tend higher. The tin market has been only moderately active but prices have advanced. Lead continues strong and none too plentiful. The upward tendency in zinc has continued and demand is satisfactory. The Memorial Day holiday has as usual tended to lessen activity temporarily.

Copper.—There has been a slight easing in the demand for electrolytic copper from domestic consumers, accentuated possibly by the holiday, but foreign demand continues heavy. The minimum prices of 13.87½c., delivered, or 13.62½c., refinery, established a week ago, continue, with the exception that some sellers have either sold at 14c., delivered., or will not quote at less than that level. A minimum price of 14c., delivered, is predicted before the end of the week. The entire market has a strong tone both as to demand and prices.

Tin.—Demand for Straits tin has been very moderate in the past week and sales, including those of May 23, which totaled about 250 tons for spot and future delivery, aggregated about 100 tons per day for the week. To-day, preceding the holiday, very little business is reported. There have been bids at 31.25c. for spot Straits with sellers asking 31.37½c. Spot Straits tin to-day is quoted at 31.25c., New York, and the London market is about £2 per ton higher than last Tuesday, May 23, at £151 for spot standard, £152 5s. for future standard and £154 for spot Straits. Arrivals thus far this month have been 3625 tons, with 6480 tons reported afloat.

Lead.—The market is a little quieter but still very strong as to prices. The strike at the refinery of the principal producer has been adjusted and production resumed several days ago, but its prices continue unchanged at 5.25c., St. Louis, and 5.50c., New York. In the outisde market values are higher with 5.45c. to 5.50c. the range at St. Louis and 5.75c. at New York and Eastern points. For Eastern delivery the metal is undoubtedly scarce, especially for prompt shipment, and an actual appraisal of the market is difficult, owing to the various ideas of different sellers.

Zinc.—The principal change in this market has been the upward tendency in prices, based upon the steady demand from domestic consumers, both brass makers and galvanizers. For June delivery the minimum is undoubtedly 5.25c., St. Louis, or 5.60c., New York, and considered scarce by some sellers at these prices. For future delivery the premium has tended to stiffen from 2½ to 5 points for each month, July delivery being at a minimum of 5.30c., St. Louis, as against 5.27½c., last week.

Antimony.—The market is unchanged with wholesale lots for early delivery quoted at 5.37½c., New York, duty paid.

Aluminum.—The market is quiet and wholesale lots of virgin metal, 98 to 99 per cent pure, are quoted unchanged by the leading producer at 19c. to 19.10c., f.o.b. plant, with the same grade obtainable from importers at 17.75c. to 18c., New York, duty paid.

Old Metals.—The market continues firm with an upward tendency. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible	13.25
Copper, heavy and wire	12.25
Copper, light and bottoms	10.25
Heavy machine composition	10.00
Brass, heavy	7.50
Brass, light	6.25
No. 1 red brass or composition turnings	8.50
No. 1 yellow rod brass turnings	6.50
Lead, heavy	4.50
Lead, tea	3.50
Zinc	3.00

Chicago

MAY 29.—Copper, lead and spelter have again advanced. Buying has not been large, but producers are holding firm and better consumption with steadier prices on a higher level is looked for. Advances in old metals have also been registered. We quote in carload lots: Lake copper, 14c. to 14.50c.; tin, 32.50c.; lead, 5.60c.; spelter, 5.30c.; antimony, 7.25c., in less than carload lots. On old metals we quote: Copper wire, crucible shapes and copper clips, 10.75c.; copper bottoms, 8.50c.; red brass, 8.25c.; yellow brass, 6.75c.; lead pipe, 4.25c.; zinc, 2.75c.; pewter, No. 1, 20c.; tin foil, 22.50c.; block tin, 25c.; all buying prices for less than carload lots.

MUCH TARIFF TALK

Bill Attacked and Defended in Senate—Changes Agreed Upon

WASHINGTON, May 29.—The object of vigorous attack and defense, the steel schedule of the tariff was taken up by the Senate last Thursday with the committee amendments prevailing in all instances so far. The greater part of the items have been disposed of in the Committee of the Whole, but the entire schedule will be returned to and attempts made before the Senate as a body to reduce the rates.

The only changes made in steel schedule rates reported by the Republicans of the Senate Committee on Finance have been those which it suggested itself. The first change it has made is in the structural paragraph. It restored the House duty of 25 per cent on fabricated and assembled material, as against the duty of 30 per cent which it proposed and eliminated the duty of 40 per cent proposed on sashes, frames and building forms and substituted a duty of 25 per cent. It also reduced from 35 to 25 per cent the duty on bands and strip steel, valued at 3c. per pound or less, whether in long or short lengths, not specially provided for. Among the other important paragraphs passed upon and left unchanged, except where noted, were those relating to pig iron (paragraph 301); wrought iron, including muck bars, bar iron, coils, rods, blooms, slabs, etc. (paragraph 303); steel ingots, blooms, slabs, billets, etc. (304); alloy steel forms, carrying additional duties on material according to molybdenum and tungsten content (305); boiler plate (307); black sheets and skelp (308); galvanized or coated sheets, plates, bars, rods, hoops, band or scroll (309); tin plate (310); manufactures of products named in latter paragraph (311); structural and fabricated steel, reduced to 25 per cent (312); hoops, bands, etc., valued at 3c. per pound or less, reduced from 35 per cent to 25 per cent (314); wire rods (315); steel wire valued above 6c. per lb., the committee reduced its own rate from 35 to 25 per cent; on flat wire, strips, etc., not thicker than ¼ in., and not exceeding 16 in. in width, reduction from 35 to 20 per cent also was made; on telegraph and telephone wire and on wire rope and wire strand, reduction from 40 to 35 per cent was made (316); antifriction balls (321); cast iron pipe, malleable castings, etc. (327); welded pipe and tubing (328); nuts, blanks, washers (330); steel wool (334); grit, shot, etc. (335); corset clasps, etc. (336); belt buckles, etc. (346); hooks and eyes (347); snap fasteners, etc. (348); metal trouser buttons (349); pins reduced from 40 per cent to 35 per cent (350).

Using Fuel in Open-Hearth Furnace

(*Continued from page* 1495)

a flame in an open-hearth furnace. The principle being to put both preheated air and fuel under high pressure separately and then unite them in a mixing chamber of small cross section before flowing into the hearth of the furnace.

On another furnace where natural gas was used for fuel, a very wide gas port was installed. The combustion of the flame in this furnace was very good, but owing to the wide port, the flame control was poor. This resulted in a high brick cost as the roof was easily burned. The time of the heats with this design of port averaged about 6½ to 7 hr. It was thought that if the port were made considerably narrower a flame with better control would be had.

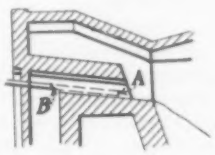

Fig. 1

A furnace was built along these lines and the control of the flame was secured as had been planned, but the depth of the gas layer was so great that the flame was smoky on the bottom and would not develop the temperature required at the point where it was needed. This experiment caused speculation as to whether a port could be designed which would embody the good qualities of both the wide and narrow port.

An experiment was made for solving this problem of combustion. A pipe was introduced into the port with one end well down on the slope of the gas port and the other projecting into the air uptake. The draft of the furnace pulled air through the pipe introducing the air under the layer of gas as it flowed through the port. The flame changed from a smoky one to one of pure white.

As soon as it was possible to do so, a port was built where this feature of combustion was embodied. The gas was introduced to the port through two pipes terminating on opposite sides of the port and at right angles to the center line of the gas port. Under the port slope several by-passages for air were provided, one end of each passage terminating in the air uptake

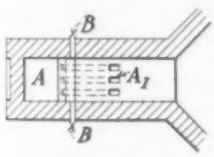

Fig. 2

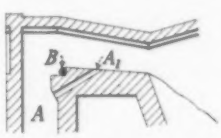

Fig. 3

and the other end well down in the gas port. Thus the flame was introduced into the furnace between an upper and lower layer of pre-heated air. These passageways being at an angle with the bottom of the port made them somewhat difficult to keep clean so that on a later design the by-passages were made parallel to the bottom of the port.

Figs. 2 and 3 show furnace designed for natural gas for fuel in which part of the air is by-passed underneath the layer of gas through openings A1 from air uptake A. The gas inlet pipes are shown at B.

The first installation, however, developed an interesting fact: in cleaning out these by-passages, compressed air under a pressure of 75 lb. was used. A trial was made to see how much deflection the flame would have if air under the above named pressure was introduced into the by-passages and under the layer of gas. Instead of causing any deflection of the flame toward the roof, the flame actually flowed into the furnace at a lower level and in a much more compact form. This showed that compressed air, if rightly applied, could be introduced both above and below a gas flame without injury to the furnace brickwork.

The cross section of the port being very much less in its nose than at the uptake gave a flame of great speed as it issued from the port, but with the introduction of compressed air the speed of the flame was still further increased. Without the use of compressed air, however, this furnace showed remarkable results: 429 heats were taken off a 9-in. roof. The heats averaged slightly less than 4 hr. and the gas consumption averaged 2800 cu. ft. per ton. The furnace was only a small one, the charge having a total weight of 30,000 lb. per heat. Cold iron was used and 15 per cent of limestone was charged. The steel was made into castings.

Later on, the same idea of mixing air with the gas was tried out on furnaces using producer gas for fuel. The first experiments along this line had by-passages from the air uptakes to the gas port. This was unsuccessful, as the pressure of gas from the gas port caused the gas to flow back through the by-passages into the air uptakes. This showed very clearly that in order to mix the pre-heated air with producer gas, the air must be introduced into gas port under a pressure higher than that of the producer gas, but as the company for which I was working at that time was unwilling to furnish the proper means for producing this action, the development of the idea was not pushed by me until a few years later. A brief description of these experiments was published in THE IRON AGE in 1912.

Figs. 4 and 5 show furnaces designed for producer gas for fuel in which the air is by-passed through the diagonal passages A1 from the air uptakes A to the gas port.

In 1917 and 1918 the thought again came to develop some means of getting a better combustion in open-

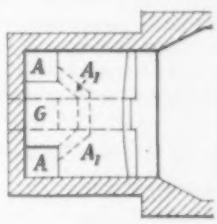

Fig. 4

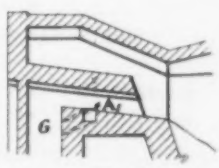

Fig. 5

hearth furnaces, and as a result of experiments the circular water-cooled port in use at the Lackawanna Steel Co. was developed. This port has given excellent results in combustion and has decreased the rebuilding cost about 20c. per ton.

One means of using compressed air with open-hearth fuel is being developed, as all know, by the Egler and McKune systems. From the outset these systems have each given excellent results in increasing production and reducing fuel costs. Some operators, however, have a doubt as to whether the use of compressed air with the fuel will not tend toward excessive rebuilding.

Again the point is brought up, as in the experience that I had some 10 years ago with the oil furnace, of being able to develop a high temperature and intense flame, but not have a furnace lining that would resist the heating action of the flame. Here is a condition which would seem to limit the development of the open-hearth furnace, but is not this seeming limitation a hand pointing out the road to a further necessary evolution in open-hearth furnace design? One cannot help but think that the construction of open-hearth furnaces will be developed along the lines that had to be made to produce the modern high-power blast furnace. By this is meant that the hearth and end walls, including the roof, will probably have to approach in similarity the construction of the bosh of a blast furnace, having roof and wall coolers alternating with the brickwork. The present pressures on both air and gas are much too low, and I see no reason why these should not run up into the pounds instead of the ounces per square inch.

We have but to look to the acetylene burner, see the pressures used and the rapidity of work done under these pressures, to sense the possibilities which may be developed in an open-hearth furnace with high pressure in both air and gas. Furthermore, the blast furnace may also teach us that with proper sealing of the doors, the sheeting in steel plate of the walls, air and gas may be introduced into the furnace under high pressure, through small orifices and exhausted by

mechanical means without the necessity for intermediate dampers. I have no doubt that heats charged with scrap and cold pig iron can be tapped in 3 to 4 hr. after starting to charge, when conditions of high pressure air and gas are once successfully developed.

It is apparent that we have scarcely scratched the surface of the field in which the ideas for developing power of open-hearth fuels are hidden.

Valves for Open-Hearth Furnaces

Types and Classes for Gas and Air—Advantages of One-Way Type—Water-Sealed Valves

BY WILLIAM C. BULMER*

THE simplest device for the periodic reversal of the flow of gases through regenerative types of furnaces is the butterfly valve, and naturally it was the one first adopted. It would be the ideal contrivance if the material of which it is made did not become distorted through the expansion and contraction caused by the temperatures to which it is subjected. Its use for the regulation of the air has been more or less satisfactory, and in some cases it still survives as an adjunct to certain classes of air valves, but its application to the reversal of gas has not met with favor.

Apparently little effort was made toward the improvement of the early valves until the year 1889, when a water-cooled butterfly valve was installed at No. 2 open-hearth plant of Carnegie, Phipps & Co. at Homestead. The idea was to prevent distortion, but difficulty was encountered in keeping it watertight and it was replaced by a cast iron one of the dry class. This, in turn, gave way to the double-seated mushroom valve in 1900.

Minimum Resistance to Flow of Gases

The chief requisites of a proper valve are an effective seal and an unrestricted passage. The choice of a valve requires most careful consideration. In order of importance we should consider, first, the valve having the minimum resistance to the flow of gases, combined with the least amount of leakage past the valve.

From investigation of installations now in use, it can be safely stated that the effective draft in the flue leading from the checkers will seldom be over 50 per cent of that found at the base of the stack. To determine the cause of draft failure, in the early stages of the campaign on furnaces at South Chicago, measurements were taken throughout the entire system of flues between the regenerative chambers and the stack. The gas valve was of a well-known type used in conjunction with a butterfly air valve, and when measurements were taken in the flue on each side of these valves there was found to be a frictional loss amounting to 52 per cent of the stack draft. This is not at all an unusual condition, as installations have been found where the effective draft in the checker flues was only 30 per cent of that of the stack.

Resistance to flow through the valves has a very bad effect on the operation of any furnace, as the slowing up in the time of heats and the final shutting down of the furnace on account of the clogging of the air checkers are largely due to the lack of sufficient draft to pull the waste gases through the restricted opening. The dirt will accumulate in inverse proportion to the draft at the checkers, and only a sufficient pull at all times will insure a sharp working furnace. The type of valve to choose is one that will permit of the draft at the checkers being as near to that of the stack as possible.

In addition to the valves, another factor which should be considered with reference to a free flow of the gases is the directness of flue passage with the shortest possible length, not only between the furnace and the stack but also between the gas producers and the valves.

Advantages of the One-Way Valve

Valves may be divided into three groups: one-way, two-way and four-way, depending upon the number of directions of gas or air passage through them. Those of the one-way group are the only ones which offer means of regulating the flow of gases to and from each checker chamber separately without additional equipment in the form of extra dampers or valves.

If a furnace is designed for proper distribution of the waste gases between the air and gas checkers, this distribution will not be maintained for long without proper valve regulation. The accumulation of dirt in the air checkers will add frictional resistance, which will decrease the proportionate amount of waste gases going through these checkers and the furnace will soon be thrown out of balance. By the use of a one-way valve, manipulation of the floor stands can be made to open the valve to any required degree, and at all times in the furnace campaign any desired proportion of the waste gases can be put through either of the chambers.

Another advantage of a single-way valve is that it can be adapted to any desired flue layout and could often be readily installed to correct present difficulties, due to poor flue arrangement, with a poorly constructed valve that might be in use. For waste heat boiler work a valve giving straight line flow with a minimum of exposed water-cooling will give the best results. Not only does this type insure higher waste gas temperature to the boilers, but because of their offering practically no resistance to the passage of the gases, they require less power for operating the boiler fan.

Types and Classes of Valves

Valves may be of the following types: Slide or damper, butterfly, mushroom and movable hood. They may be classed as dry, refractory-lined, water-cooled and water-sealed.

The slide and butterfly types may be of any of the classes or combination of classes, but the water seal is rarely applied to them. The mushroom type may be of any of the classes. The movable hood type is usually refractory-lined and water-sealed, although the refractory lining is sometimes omitted. In general, the butterfly valve may be considered as a modified slide or damper. The slide valve, of all those devised, offers the least obstruction to the passage of the gas through it. Invariably, in the other types, a change of direction in the path of the gas of from 90 deg. to 180 deg., and in some cases as much as 360 deg., occurs, and the friction losses are therefore bound to occur.

In the dry class no attempt is made to cool the casting or plates of which the valve or its seat is made. The slide and butterfly are frequently of this character.

The refractory-lined valves are confined mostly to the slide, mushroom and movable hood types, although nearly all have the surrounding hood, where such is employed, lined with brick. Refractory linings are hard to hold in place.

The water-cooled valves embrace the slide, butterfly and mushroom types. They have the principal parts, including the seat, filled with moving water, whereby an even temperature within the member is maintained and distortion from expansion and contraction prevented. They are not always reliable and are particularly likely to fail after a short time when made of cast iron.

About the year 1914 experiments were begun with a water-cooled damper valve made of rolled steel plate and at the present time it is possible to procure a welded steel plate valve working on an inclined water-cooled seat, each having machined surfaces where con-

*Superintendent open-hearth and Bessemer departments, Ohio Works, Carnegie Steel Co., Youngstown, Ohio.

tact is made, that will give a minimum amount of leakage and is so constructed that any expansion or contraction that might take place does not tend to distort the valve and destroy the seal. Some trouble was experienced with the accumulation of a carbonaceous material on the face of the valve which might tend to cause leakage, but with the present valve the trouble has been so slight that it is being given very little consideration. The addition of a refractory surface, where the valve is exposed to the producer gas, will materially aid in eliminating any slight trouble from this source.

Water-sealed valves provide the most perfect seal that has as yet been devised and can be used effectvely with the mushroom or the movable hood. In each case a projection of the valve is plunged into a basin of water of sufficient depth so that the liquid column will more than balance the difference of pressure within the conduit and the atmosphere or adjacent passageway. The glaring fault of this class of valve lies in the water evaporation that takes place from the basin; the passing hot gas picks up the vapor and is cooled to an appreciable extent. There is also more or less water splashed into the gas flues at each reversal. This not only must be evaporated, but coming in contact with the brickwork of the flue causes deterioration.

At the Gary Works of the Illinois Steel Co., on some of the stationary producer gas furnaces, the change from a valve having exposed water and exposed water-cooled parts to one having a minimum amount of exposed cooling surface, resulted in an increase of temperature in the waste gases going to the boilers of approximately 180 deg. This temperature difference checks up very well with the usual temperature drop found through the ordinary types of valves which offer a large amount of exposed cooling surface, and in one investigation I found the temperature to show a difference of 240 deg.

A similar change of valves at Weirton has resulted in their increasing the waste heat boiler output from 58 per cent to 78 per cent of rating. Weirton is getting this rating from their boilers on a low coal consumption, which, when their furnaces are working properly, is approximately 450 lb. per ton of ingots.

Another objection to a valve having a water-sealed seat has been that it is always liable to leakage in portions that are hidden from the view of the furnacemen, and it is only when the effect upon the working of the furnace is noted that inspection, which in most cases is difficult, proves that the trouble is due to a crack in the casting, and it not infrequently happens that a negative pressure will cause a portion of the water to syphon from the basin into the flue. The substitution of welded steel plate seats for cast iron seats has to a great extent eliminated the trouble due to leakage, but the immersion of the valve into the water when the seal is made will remain a constant factor in the splashing of water over the edge of the seat and into the flues.

For moving valves every known method has been applied, including hand power, hydraulic, pneumatic and steam cylinders, and electric motor. The latter method is no doubt the most satisfactory.

Much thought has been given to the development of a satisfactory water-cooled valve and seat, and to one having a perfect seal, but it would appear that with the exception of two of recent invention, *i.e.* one in which one end of a section of flue swings through an arc of a circle connecting adjacent flues, and the welded steel damper type having an inclined water-cooled seat with machined working surfaces, none measure up to the requirements we have stated for an ideal valve. Too much weight should not be given in the choice of a valve to the first cost.

The water-cooled slide with inclined seat comes nearest to the perfection we are seeking. Its durable mechanical construction, including sturdy manipulating devices, all of which is easily accessible for repairs, combined with straight line flue passages, least heat losses, independent control of flow for each chamber, minimum leakage, adaptability to local conditions, small space required, minimum loss of fuel at time of reversal and low maintenance cost, recommends it to our serious consideration.

Electrification of Steel Mills

General Effect on Operation—Advantages of Central Power Plant—Details of Certain Results

BY WILFRED SYKES*

IT is only about thirty years ago that electricity was first introduced into steel plants for motive power purposes. For many years it was a very small factor and was used only in those places where mechanical drives were difficult, such as traveling tables, cranes, etc. Later, due to the experience gained with such applications, it was used for other auxiliary purposes around the mills, again mainly on account of convenience and, while good results were obtained, development undoubtedly lagged, due to the lack of suitable apparatus. However, when enough mills were interested to make it profitable for manufacturers to build special equipment for the severe operating conditions, a rapid improvement took place, which added greatly to the reliability of these auxiliary drives. Hence the present generation of operating men takes the electrically driven auxiliary as a matter of course.

When we come to the main drives, there is perhaps not such a clear understanding as to the reasons for the replacement of the old and well-tried steam engine. In the case of the auxiliaries, questions of convenience, reliability and easy maintenance are important enough to justify the use of motors. But in the case of the main drive, the steam engine has apparently operated as well as desired and, due to a long period of development, has reached a stage where it gives reliable operation, when properly designed for mill service. Therefore perhaps it would be well at the outset to get a clear conception of why we electrify mills, as, frequently in discussions, details so confuse the issue that the fundamental reasons are lost to sight.

Perhaps the greatest economy of electric drive is due to the small loss with which this form of power can be distributed and the fact that the loss varies with the load, so that the lines can be kept charged ready to supply power as demanded and loss occurs only when power is actually being used. Even at full load, the loss in the lines seldom exceeds one or two per cent. If we contrast this with steam distribution, the saving is obvious. It would not be an overstatement to say that, as we can seldom account for more than 50 per cent of the steam generated, the difference must be pro-rated over the different mills. It is therefore misleading to talk of any engine consuming so many pounds of steam per hp. or per ton of steel rolled, unless we take into consideration this factor, since what we are really interested in is the amount of fuel used to roll a ton of steel.

To convert electrical energy to mechanical work,

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*Assistant to operating vice-president, the Steel & Tube Co. of America, Chicago; formerly general engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh. The paper, of which this is an abstract, was read before the American Iron and Steel Institute, New York, May 26.

the efficiency of a continuously running motor under the varying conditions of load will usually average well over 90 per cent. In the case of a reversing mill, which involves first the conversion of electricity from one form to another and then into mechanical work, as well as providing for equalization of the peak loads, the overall efficiency from the switchboard to the mill coupling will run over 75 per cent.

In any discussion of economy we must be careful to distinguish between theoretical figures and actual operating results, as we are interested in the overall efficiency from the energy in our gas or coal to the mill coupling, during a month's or a year's operation. The best measure is power cost per ton of material shipped. Completely electrically-driven mills show decided advantages when this measuring stick is applied.

As a matter of interest, I am giving a few figures of two reversing mills in our plant, one being the blooming mill and the other the universal plate mill. The former rolls ingots (20 x 22 in., weighing 7,300 lb.) to blooms averaging about 6 x 8 in., for the billet mill, and ingots (16 x 38 in., weighing 10,500 lb.) to slabs for the plate mill. The latter rolls the slabs from the bloomer to skelp for the pipe mills, a typical range of which is given later.

Power Consumption of Reversing Mills, Steel & Tube Co. of America, for 1920

Kind of Mill	Gross Tons of Ingots or Slabs Rolled	Kwhr. per Ton, Main Drive Only	Power Cost per Ton, Main Drive Only
Blooming mill.....	444,510	16.2	17.8c.
Plate mill	191,524	31.9	35.1c.

Average coal cost per ton at boiler house during year = $5.07. Gas charged for at coal price on basis of equivalent evaporation.

To sum up, the central station manufactures power wholesale and, through a cheap distributing system, delivers it to the consumer as required. If the mill does not require power, it does not have any losses to take care of. It is very much the same situation as exists in the commercial field. If we had poor distributing facilities for steel commodities, it would be necessary to have a great many plants scattered over the country to take care of local demands, some of which plants would be busy and some idle, with consequent low average efficiency. As it is, a few plants in favorably situated localities ship to consuming points as required. We pay freight only as we ship. The demand of one locality frequently balances a lack of demand from another, so that the plants can be run at good average load and efficiency.

In the curve that shows the growth of the horsepower of motors used for driving main rolls in units of 300 hp. and above it will be seen that the total is approaching 1,000,000 hp. The curve indicates the increase in popularity of this form of drive as experience is gained. It can be safely stated that practically all modern plants are electrically driven. In fact, electricity is almost exclusively used where the plants have the benefit of good and mature engineering advice.

The rapid extension of steel-making and finishing capacity in recent years would indicate that in the immediate future the problem will be not so much extensions, as a rehabilitation of the older plants to enable them to operate with such efficiency as to be competitive, and this will require careful consideration of electrification as a means to this end.

Necessity of generating electricity for auxiliary purposes, regarding which no one questions the advantages, requires stations of substantial output. The following table illustrates this point and shows the power used for main drives and for auxiliary purposes at the Mark plant during 1920. It will be seen that, if the mills were driven by engines, a large proportion of the total power would have had to be electrical in any case.

Mill	Kilowatt-Hours: Main Drive Only	Kilowatt-Hours: Auxiliary Purposes
Blooming mill	7,061,000	5,040,000
Plate mill.....	6,111,000	2,967,000
Billet mill.....	2,920,000	1,890,000
Skelp mill.....	7,700,000	.....
	23,792,000	9,897,000

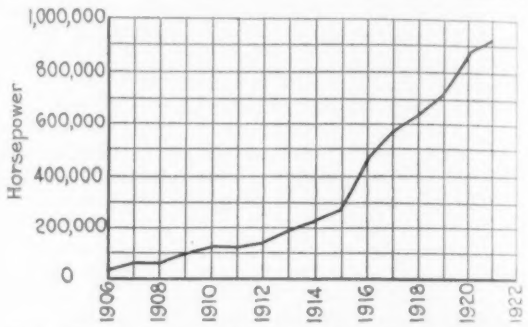
Total power generated..... 53,428,000 kwhr.
Consumed, main drives..... 23,792,000 kwhr. (44½ per cent)
Consumed, mill auxiliaries... 9,897,000 kwhr. (18½ per cent)
Consumed, other parts of steel and coke plant..... 19,739,000 kwhr. (37 per cent)

Production

Leaving the general characteristics of electrification I will endeavor to answer some of the more important questions that interest the executive and operator. The first question that is asked regarding any method of driving our mills is whether it will enable us to get the desired output. This is not only a question of the amount of power available but of the characteristics of the driving unit, and the subject must be considered in relation to the different types of mills—continuously running and reversing.

Continuously Running Mills

In the case of a mill running continuously in one direction there are practically only two points to be considered: power and speed characteristic. So far as power is concerned, any output required by our mills presents no unsolved problem to the motor designer. Much larger motors than any individual



Total Horsepower of Motors of 300 Horsepower and Above Used for Driving Main Rolls in the United States

mill is likely to need have already been built. I believe the highest rating of any machine driving a continuously running mill is that of the motor driving the 160-in. plate mill at Gary. This motor is nominally rated at 7,000 hp. but, to meet the particular specifications, it actually has a continuous capacity of about 9,000 hp. In operation, this machine frequently carries peak loads up to 18,000 to 20,000 hp. The largest electric motor that has been built to date has a continuous rating of 22,500 hp., or more than twice the capacity of the 160-in. plate mill motor, and there is no particular reason why larger machines could not be constructed if demanded.

Speed Characteristics

Regarding the speed characteristics, the ordinary motor tends to run at a practically constant speed, independently of the load. Where a flywheel is used, the object is to assist the motor in carrying short time peak loads. For instance, in the case of a plate mill, the early passes may require four to five times the power of the motor for a fraction of a second. It can be arranged readily that the motor will take a certain proportion and the flywheel supply the remainder. When the passes become longer, the peaks are reduced and the motor then carries a greater proportion of the load. By the proper inter-action of the motor and the flywheel, an economical balance is reached. The speed characteristics of the motor are usually varied by means of the control equipment and can be adjusted readily to suit individual operating conditions.

In the case of mills where the passes are long, the flywheels are of less value and it is frequently desirable that the speed remain practically constant, which is the inherent characteristic of the motor. We therefore have the possibility of either maintaining the speed constant within two or three per cent or of regulating it to give the best operating results, depending on the load condition. In some cases that have come to my attention, it has been stated that the mills have an output of 5 to 10 per cent greater when electrically driven.

Reversing Mills

There has been more discussion regarding the motor driven reversing mill, in comparison with the

steam engine drive, than of any other type and this is quite natural, as the motor is an invader in the field for which the engine seems to be particularly well adapted. Quickness of maneuvering and ease of speed control is of the utmost importance for a successful drive. This will be appreciated when it is realized what a comparatively small percentage of the time the metal is in the rolls. An analysis made of a number of steam and motor-driven mills shows that, in the case of a blooming mill operating rapidly, the metal is in the rolls about 30 to 40 per cent of the total time of rolling, while from 60 to 70 per cent of the time is required to handle the steel. Casual observation of the mill does not reveal this, but it is surprising how closely well operated mills approximate to the same figures.

Actual records show that the motor can give a good account of itself. I am quoting a few figures from different mills which indicate the output that can be obtained in practice. These do not represent, in any way, the limits of a motor-driven mill, as development is still taking place which enables the equipment to operate more quickly and more efficiently, and much higher figures can be obtained than the ones quoted.

At the plant of the Trumbull Steel Co., Warren, Ohio, there is installed a 36-in. blooming mill which rolls ingots 20 x 22 in., weighing 6,700 lb., to 6¾ x 6¾ in. blooms, in 13 passes. This mill has rolled 60 of these ingots in one hour and the operators feel that this figure can be improved.

Perhaps a better indication of the speed with which a motor can be handled is given by the machine driving the roughing stand of the 84 in. tandem plate mill of the Brier Hill Steel Co. The following figures show a 12-hr. and 24-hr. record. It will be seen that there is very little difference between the 12-hr. and the 24-hr. figures.

Rolling Records of the 84-In. Tandem Plate Mill of the Brier Hill Steel Co.

	12 Hr.	24 Hr.
Number of slabs	1,659	3,270
Number of passes in roughing mill	7	...
Maximum number of slabs for one hour	220	...
Total charged weight, tons	373	716
Total finished weight, tons	315	518
Finished tons of 10, 11, 12 and 14 gage, U. S. Standard	23	71
Finished tons of 8 and 9 gage	13	435
Finished tons of ⅜-in., No. 10 gage	26	6
Finished tons of ¼-in. and heavier	253	6

It will be seen that this mill averages, over a 12-hr. period, about 16 passes a minute or less than 4 seconds per pass, which takes in all delays due to any cause. This mill has been in operation since September, 1919, and the performance has progressively improved as the men became familiar with the best methods of operation.

A third illustration is that of our universal plate mill, which has rolls 30 in. in diameter and can roll universal plate up to about 46 in. wide. It is used for rolling skelp for the pipe mills and the material is, on an average, small for this size of mill. During the month of March, 1920, this mill turned out 23,014 gross tons of material and, as a matter of interest, the table shows how this was made up, from which it will be seen that the gage was fairly light and the width not the best to secure maximum tonnage.

It will also be seen that the delays were appreciable, which was due to the necessity of waiting for steel at times, roll changing and minor troubles. We do not feel that this represents the limit of capacity of this mill and, if necessary, it could probably be boosted up to close to 30,000 tons per month by the addition of more heating furnace capacity, and perhaps the elimination of some of the rolling sizes which are entirely too small for a mill of this size.

These examples will give an indication of what is actually being done with reversing mills already installed. It has been my experience that factors outside of type of drive have in general limited tonnage. Much greater outputs can be obtained if necessary.

Operating Labor

A factor in which operators are particularly interested is operating labor. Most mills feel that their larger and more important drives, such as reversing mills, should have an attendant present to watch them, mainly as a precautionary measure. In the case of continuously running mills, there has been enough experience to show that this is not necessary, and now it is customary for one man to inspect a number of machines and to take the usual meter readings for the mill records. When an operator is employed continuously to look after a drive, the usual practice is to put substation equipment under his control, as it is generally convenient to install converting apparatus in proximity to the main drive. These men have very little to do outside of occasionally looking over the machines and taking meter readings. The actual work in attending to a reversing blooming mill drive, for instance, I do not believe would exceed one hour per day. At the Mark plant the blooming mill has been charged, for the years 1918 to 1921, an average of $393 per month. In the case of the reversing mill of the Steel Co. of Canada, from 1913 to 1919, the average has been about $250 per month. The difference is mainly due to the fact that the figures for the former cover the period of highest wages in the mills.

Maintenance and Repairs

Electrical machinery requires maintenance, as well as any other equipment. With intelligent electrical superintendents most of the expenditure is of a precautionary nature and repairs due to breakdowns become a very small item. As an illustration of the maintenance and repairs on reversing drives, the experience of the Steel and Tube Co. of America can be cited. For the four years, 1918, 1919, 1920 and 1921, the maintenance and repairs for the reversing blooming mill drive averaged $184 per year. In the case of the reversing plate mill drive previously referred to, the ordinary maintenance and repairs have averaged about $173 per year and the expenses in connection with the failure and complete rewinding of the armature totaled about $6,530.

Maintenance of the blooming mill of the Steel Co. of Canada has averaged, since it was installed, for all purposes, about $1,280 per year. This higher cost compared with that at the Mark plant is due mainly to the smaller size of the plant, and a part of the difference may be ascribed to improved design of the later equipment. The supplies for operating these two blooming mills have averaged in each plant about $50 per month. These figures give an idea of what can be expected of reversing mills.

In the case of continuously running mills, the expenditures vary considerably, some mills paying practically no attention to their equipment while

Universal Plate Mill Production, March, 1920

Slab Sizes, In.	Slab Weights, Lb.	Sizes Rolled—Width and Thickness, In.			Product, Gross Tons
11¾ x 4	Various	12	0.375	A	12
15 x 4½	1,480 to 1,240	15	0.250	B	1,598
15 x 5½	1,790 to 1,440	15	0.360	B	72
18¾ x 5½	2,270 to 1,905	18½	0.310	B	510
18¾ x 6	2,480 to 1,990	18½	0.385	B	145
22¼ x 5½	2,650 to 2,220	22	0.290	C	1,003
22¼ x 5½	2,630 to 1,975	22	0.437	D	25
22½ x 5	2,320 to 1,940	22¼	0.255	E	174
23¾ x 4½	2,390 to 2,000	23½	0.245	C	288
23¾ x 5½	2,780 to 2,340	23½	0.285	C	2,816
23¾ x 5½	2,820 to 2,270	23½	0.345	C	4,149
25½ x 6	3,165 to 2,385	25	0.465	D	25
29¼ x 4½	2,850 to 2,290	28¾	0.285	C	953
29¼ x 4½	2,900 to 2,325	28¾	0.290	C	774
29¼ x 4½	2,920 to 2,350	28¾	0.295	E	125
29¼ x 5	3,210 to 2,600	28¾	0.320	C	3,302
29¼ x 5	3,280 to 2,630	28¾	0.330	C	1,038
29¼ x 4½	2,925 to 2,210	28¾	0.365	C	931
28⅜ x 5	3,110 to 2,660	28¼	0.437	G	27
29 x 5½	3,330 to 2,190	28½	0.585	F	132
33¼ x 5	Various	32¾	0.375	A	74
36½ x 5½	4,280 to 3,580	35½	0.290	C	872
36½ x 4½	3,180 to 2,390	35½	0.320	C	1,056
36½ x 5½	4,380 to 3,580	35½	0.360	C	1,837
36½ x 5½	4,380 to 3,580	35½	0.365	C	319
36½ x 5½	4,500 to 3,430	35½	0.450	C	506
36 x 5 to 4½	2,160	42¾	0.345	C	251

Lengths: A, various; B, 18 to 19 ft.; C, 19 to 20 ft.; D, 18½ to 19 ft.; E, 19 to 19½ ft.; F, 18 to 18½ ft.; G, 9 ft. 11¾ in.

Total gross tons rolled	23,014
Total hours worked	648
Total hours delay (= 12.2 per cent)	79
Actual hours worked	569
Total slabs rolled	21,100
Good product, per cent	94
Maximum day, gross tons	1,101
Minimum day, gross tons	732
Average day, gross tons	852

others carefully clean and revarnish their machines at intervals. In going over the figures of plants where freedom from breakdown is characteristic, it would seem that for motors from 2,000 to 3,000 hp. we should spend perhaps $200 to $250 per year to keep them in condition. The cost will vary somewhat with the number of equipments the force has to look after as, with a large plant, the cost per machine will average less than in a smaller mill.

I have given a few examples that will indicate, to those whose duties do not bring them in close contact with electrical equipment, what can be expected. It should be borne in mind that manufacturers have profited by their accumulated experience and many possible sources of troubles have been eliminated in recent installations. Another factor that will tend to secure even better results in the future is that a body of intelligent electrical engineers and attendants has been built up by our technical and trade schools, as well as by the principal manufacturers, from which our mills can draw good men. The electrician of the development period was often very expert in making repairs but did little to avoid them. To-day men are available who have been trained to avoid troubles.

Industrial Housing in the Steel Industry

What the Term Means—Fundamental Conditions to Be Met—Policy of the Steel Corporation

BY C. L. WOOLDRIDGE*

MOST manufacturers who first built houses for their workmen did so, not because they felt that such a project would increase their earnings or the employes' efficiency, but solely because there existed a housing shortage and they could not get the necessary help to operate their plants unless they provided a place for the men to live. At about this same period, some employers began to improve the working conditions in their plants. They found it was easier to get men and hold them if their plants were clean and light, had decent toilet facilities and were made as safe as possible; it was found that not only the turnover was less expensive, but the employees' efficiency was actually increased.

I do not in any degree discount or disparage the employers' humanitarian motives in this movement. Unconsciously, perhaps, but certainly very effectively, the iron and steel industry for many years has been dealing with the family unit. And so we have gradually come to consider that the term, "Industrial Housing," means not merely the providing of a shelter for the family, but it comprehends stores, schools, churches, parks, recreation fields, playgrounds and other places of amusement.

Lincoln Row at Wilson, Pa.

By far the most expensive and important part of industrial housing is the dwelling itself, and this also has passed through a startling evolution during the last 30 years. Thirty years ago, we built good, spacious and very often beautiful houses. As our communities began to grow, houses began to cost more. Then in order to hold down the cost, we began to cheapen the quality. Then we reduced the size of the house by omitting unnecessary rooms, and again further reduced the size of the remaining rooms, but still the cost continued to go up. Then some of us began to give up the house and adopt the flat and apartment. But the same story repeated itself. The more we built, the more they cost. So again we reduced the number of rooms. Then we reduced the size of the rooms. Then we began all over again and reduced everything all around, everything but the cost.

During the war, this frantic effort to hold down the cost resulted in some very bad industrial housing. Thousands of houses were built throughout this country which, while having a pleasing exterior, were utterly impractical. Personally, I have seen such houses where it was only possible to get furniture to the second floor by taking it through the second story windows. I know of one development where, in a majority of houses, there was no place for the piano except over the hot-air register, and the piano usually is one of the workingman's standard pieces of furniture.

Three years ago the United States Steel Corporation companies began to devise a set of standard tests which are now applied to all house designs to insure against such results. Those tests are the result of experience in designing and building thousands of industrial houses and are being developed gradually. The industrial house must meet three fundamental conditions:

It must fit the average workman's furniture.
It must be reasonably convenient and easy to care for.
For economical reasons, it must be as small and compact as is possible without hurting the first two conditions.

A careful survey of all our existing houses enabled us to make up what we call a "minimum furniture list," in which we have enumerated by size every item of furniture which the average workman owns. For instance, every bedroom in a Class No. 2 house must contain, in addition to a clothes press, room for one double bed, 4 ft. 6 in. by 6 ft. 6 in.; one dresser, 1 ft. 10 in. by 3 ft. 6 in.; one chest of drawers, 1 ft. 10 in. by 3 ft.; and two chairs, and we have a similar list for every room in the house. The first step in checking a plan is to draw in place all of the furniture to scale. The wall space must be such that this

*General superintendent Carnegie Land Co., Pittsburgh.

Typical Example of Hillside Duplex Houses of Carnegie Land Co. The entrance to the lower house is on the street below and at the rear

furniture can be placed without interference with doors, windows, hot air registers and electric light switches.

The convenience of the house is checked entirely by observation. For instance, it must be possible to place all beds so that the housewife may dress them without pulling them away from the wall, and she must be able to get food from the ice box without going to the cellar.

It is astonishing how many plans for industrial houses should be rejected by the application of these simple rules, but we now go much further. It is easy to get in the furniture and make the house convenient at the expense of wasting much room, and in order to check this, we have devised a set of rules for checking the efficiency of every type of industrial house. For instance, the efficiency test for a two-story, Class No. 2 house is as follows:

On the second floor only, we compute the floor area of all bedrooms, to which we add 42 sq. ft. for the bathroom and 6 sq. ft. for each bedroom clothes press. This total area must be at least 74 per cent of the total area of the entire second floor or, in other words, not more than 26 per cent shall be devoted to stairs, hallways, partitions, etc. If the percentage falls below 74 per cent, the plan is re-studied or else discarded.

After we had been using these tests for a certain length of time, we found that it was possible to meet the conditions we had laid down and still not have an economically designed house because it is possible, under these rules, to have the bedrooms larger than is necessary and thus raise the percentage of efficiency and, of course, the cost of the house. So at this point, we now bring in what we call a "cubage test." The cubage of a house is the total number of cubic feet contained by the outside walls, the cellar floor and the roof. It is obvious that in houses of identical materials and similar types of construction, the one satisfying the furniture requirements within the smallest cubage and yet having the highest efficiency percentage, combines best the desirable elements of utility, compactness and low construction cost.

After applying these tests to many hundreds of plans, the Carnegie Land Co. has finally selected seven model floor plans which enable it to build anything from four to seven rooms, either in the two-story or three-story house. Our cheapest house is built over a half cellar, contains no bathroom, and the dining room and kitchen, or the dining room and living room, are combined as one room, while the better class of house contains separate rooms for these purposes, includes a bathroom, and is built over a full cellar. Each one of these seven plans can be built within the smallest cubage, yet each one meets all the necessary furniture requirements and shows the highest efficiency percentage.

It is not possible in a paper of this length to describe these tests in detail, but I believe if they were generally used, much bad industrial housing would be avoided.

We have also adopted many standards which tend to reduce the cost of the house. We have a standard ceiling height for each floor, standard size for windows and doors, standard wood trim for the inside of the house, standard hardware, and in fact we hope ultimately to have everything so standardized that only a very brief specification will be necessary.

One of the important benefits which have come out of this effort to reduce costs is that we have all discovered we do not really need as much house as formerly. In fact, we now welcome anything which tends to simplify housekeeping as the small house does it.

Houses in One of the Superintendents' Sections at Homestead Park

The housing committee of the United States Steel Corporation, which is made up of representatives of its subsidiary companies, is making a careful study of all these matters and has sub-committees at work on every phase of industrial housing.

There are still a great many problems in connection with industrial housing which are not satisfactorily solved. For instance, one of the gravest questions now confronting employers, who have housing developments, is the matter of obtaining adequate rentals. I have heard of very few developments in which the rents are producing anything like a fair return. In other words, such houses are being rented at rates which are far too low. This has two very bad effects: first, it has discouraged outside capital from building, because it cannot compete with the low rentals; second, it tends to influence the employe against owning his home.

In this connection, it is proper to mention the home owning plan established by the Steel Corporation, whereby an employe may acquire his own home under easy and favorable terms, and which has been the means of many employes buying their homes, who without such a plan would still be renters.

The Doctor's Relation to the Steel Plant

His Rôle as a Repair Man—Selection of the Right Man—Causes of Ill Health and Inefficiency

BY LOYAL A. SHOUDY*

FOR many years it has been the custom in mines and plants to have available a group of men whose duty it is to be on hand when "something goes wrong." They may come from the electrical department, from the mechanical department or any combination, it matters not because their function is the same—to repair.

The Doctor as a Steel Worker

The doctor as a steel worker is comparatively a new institution. A few years ago many of you doubted the wisdom of admitting a doctor to your steel family, and I know that the doctor has had to prove his right to be included in your family. You have always looked upon the doctor as someone apart from real work and have never considered him as being able to help in the manufacture of steel. The doctor's repair shop must be a place where the injured men are glad to go. It must be so conducted that the men will feel confident that they will receive the best of care.

You would not think of employing an open-hearth superintendent on part time; why employ a part-time doctor. You need his undivided thought and attention just as much as you need the open-hearth superintendent's time. Select the right man and pay him; make him feel he is a part of your steel organization and let him be proud of his position. Medical work is not a charity; it is a part of your plant, a part of your production and helps in your profits in proportion to how you develop and use it. The conditions under which the doctor works and the things he does are important; but what he is, his sympathy for men, and his insight into the understanding of their problems, these are the things which are sure to reflect credit upon him and his profession.

Periodical re-examination will keep your men fit. Use the doctor's repair shop, because many times repairs can be made; but it is hard to rebuild the human machine. When the man once knows that you are interested in his health and are sincere in helping him, he will more than welcome your plan. Fitting the man to the job and not the job to the man should be the work of the plant doctor.

I believe Mr. Schwab is responsible for the phrase "work with" not work for. If any man should "work with," it is the doctor. He works with the men, cheerfully, carefully, ably, and cares for the small wounds in the same thorough manner as the large ones. From the operative standpoint, you view the foreman as the keyman for production. The doctor and the foremen must be friends and co-workers. When talking to foremen, I always drive home the importance of their position.

The doctor becomes more than a repairman to human machines, he becomes a teacher, he leads the foreman to see the needs of his men, shows him that coughs and ruptures are capable of being repaired, stimulates in him a pride in having a good healthy gang of men and that the condition of his men reflects on him, because good men, mentally and physically, satisfied under his leadership, will do more and better work. Accidents of some sort will always happen. The safety engineer has done much to lessen their number and severity. The doctor and the safety engineer must work hand in hand.

Selection of the Doctor

You should select your doctor with as much care as you select your superintendent or general manager. Select a doctor who has a high idea of the importance of his work. Select a doctor who has a real feeling for his fellowman and an understanding and vision of men and work. The doctor who does not see that his profession leads beyond the care of the bodies of men into their moral and mental health is not living up to his opportunity and duty, and especially is this true of the industrial doctor.

I believe that to no other man is given as great an opportunity to promote a better mutual understanding and relationship between employer and employee as is given the doctor. The doctor in the plant should understand the workings of the plant, he must at all times work in harmony and co-operation with the various departments of the plant. He must understand men.

The steel industry has become so large, the number of men employed so great, that the employer sees the worker only in mass. The plant doctor—"his vision must be so clear, his sympathy so great, his sense of justice and fair play so keen, that however great the mass, he never loses sight of the individual."

The doctor knows that right mental conditions are just as important for the welfare and efficiency of a man, and that they have as much to do with output and profits, if viewed from the employer's point of view, and are deserving of as much attention as physical conditions. You know mental ailments need treatment.

Causes of Industrial Ill Health

Man is a machine—human as against mechanical. Iron or steel will not stand up under constant use, neither will man; he must be oiled and repaired occasionally, his habits changed at times and steered into another track. This he will not do of himself until the breakdown comes and then in most cases it is too late. As a result, through impaired health we have inefficiency—a liability to industry, the family and the community.

Industrial ill health and inefficiency are due to:

Lack of proper ventilation—gases, fumes.

Lack of proper lighting—eye strain.

Necessity for change of occupation due to loss in sight, lung trouble, bodily injury or disease.

Improper sanitation—drinking water.

Treatment boils, occupational skin diseases, headaches, stomach, etc.

Lack of periodical examination of men.

Lack of consultation, prescription and advice.

The doctor should anticipate and remove the causes

*Chief Surgeon Bethlehem Steel Corporation, Bethlehem, Pa.

of ill health, either in the environment or in the human machine. Preventive medicine and the doctor's advice are surely as important and warrant as much attention as we are giving to accident prevention from the educational and mechanical standpoint; and especially so when many accidents are due to the ill health of the individual.

Good will is essential to competent medical supervision. The plant doctor finds himself many times in a position in which he can bring both foreman, superintendent (employer) and the man (employee) to a better understanding of each other.

Dean Marquis has said that corporations have no souls. If this be true of corporations which have included a physician in their organization, then it is the fault of the physician, for it is his duty to put a soul into a corporation. Let me bring to you these points:

1. The success of industry in the broadest sense can be measured by the degree of understanding and good will attained between management and men.

The doctor is a promoter of good will.

2. The human ills of industry are mainly due to lack of points of contact between the man and the master.

The doctor is a point of contact.

3. The deepest and most lasting form of gratitude is given to him who relieves the sick or injured of their pain and consoles them in their hour of trouble.

The industrial doctor, of the proper type, is the most potent individual force in industry if empowered to care for the human machine while subject to the occupational environment on the job.

THE AFRICAN MARKET

Canning Industry Prefers American Tin Plate—Large Market for Rails and Structural Steel

Africa is a potential market for American iron, steel and heavy hardware, according to Max Greenberg, who has been traveling the past year for Rownson, Drew & Clydesdale, London, in the Union of South Africa, Rhodesia, all east coast and west coast ports and as far as Port Said, Egypt. The rail requirements for construction now under way and projected, not only in the Union but throughout Africa are large, and under present conditions this market could without difficulty be made practically exclusive for American tin plate, which even to-day has a strong footing. According to Mr. Greenberg, not only is there no particular tendency to purchase in England, but in a large number of instances American material is evidently preferred.

Tin plate of American manufacture is used largely by the canning industry of the Union, as its qualities are much more satisfactory than those of the Welsh tin plate. The Welsh product was used prior to the war, but the introduction of more modern machinery and the more rapid work now being done in the production of cans has proved the American tin plate, with its easy bending qualities, to be superior to the Welsh tin plate. The plant of the South African Sheet & Tin Plate Co. is stocked with Welsh tin plate that cannot be disposed of to the canning industry or used by them in the manufacture of cans, and they are satisfying their requirements with material purchased from the United States Steel Products Co., the ordinary prime coke tin plate proving better for bending.

As proof that there is an opportunity for American sales in these markets regardless of whether purchases are made by the Government or private buyers, Mr. Greenberg points out the contract for grain elevators, placed by the Union Government some time ago with the American Trading Co. About £250,000 was loaned by the British Government for this purpose, and it was naturally supposed that the contract would go to British companies. The American price and specifications were, however, found more satisfactory.

Rail requirements, generally for 45-lb. rails on the railroads and lighter rails on the tramways in the cities, are being almost exclusively satisfied with British producers, as well as fabricated steel for bridges and other purposes. The Robert Hudson Co., London, which maintains a large office in Johannesburg and numerous small branches throughout Africa, is to-day obtaining the greater part of this business, according to Mr. Greenberg, largely because of the fact that they are on the ground. It is noteworthy that on locomotive contracts they generally furnish Baldwin locomotives. The most recent large rail order going to Robert Hudson Co. for about 500 miles of 45-lb. rails, was placed for the Mozambique company.

In Port Elizabeth and Capetown, Mr. Greenberg found American material considered most favorably, and in a majority of stocks the major portion of the material was of American origin. American sheets, he said, cannot at present compete, because of price, although there is a good market particularly for galvanized corrugated sheets which are used extensively for roofing, industrial buildings and tanks. Considerable No. 8 gage galvanized wire of American make was in evidence in fencing and the barbed wire preferred seemed to be that of the United States Steel Products Co. Wire screening from the Wickwire Spencer Steel Corporation and the American Wire Fabrics Co., were popular, but a large part of the wire being purchased was of either Belgian or German origin, the Germans evidently being able to make fairly good deliveries. Delivery on nails from Germany, however, was declared by buyers to be wholly inadequate and a large part of the nails being consumed were from Lorraine, Austria, Belgium and Great Britain.

Throughout Africa Mr. Greenberg found buyers of the opinion that should the United States enter these markets consistently more business would be obtained than is now being placed.

More Metal Workers at Higher Wages

Iron and steel plants, according to figures of the Bureau of Labor Statistics, show for April a gain over March of 7636 employees in 106 establishments. This gain of 6.75 per cent was accompanied by a gain of 7.5 per cent in amount of payroll and a corresponding gain in the April pay envelope from $44.15 to $44.45, or 0.7 per cent.

In the automobile industry the gain in 45 establishments was 6.3 per cent in number of employees and 21.8 per cent in payroll total. In car building and repairing there was a gain of 0.2 per cent in number of employees in 63 establishments, but a loss of 1.2 per cent in amount of payroll.

Metal workers as a whole, represented by these three groups, show a gain of 13,270 employees (5.15 per cent) during the month, accompanied by a gain of 6.2 per cent in total payroll. The average pay envelope advanced from $53.19 to $56.09, but it is still far below the $62.00 of last year.

Wages in car building and repairing, due to the continuance of war time wages in railroad repair shops, are considerably higher than in the steel industry. The excess in April over steel mill wages was 29 per cent. Wages in automobile plants, which are exceptionally busy, were 58.7 per cent over those prevailing in steel plants. Details are shown in the table.

Period	Number of Establishments	Number of Men	Half-Month Payroll	Average Pay Envelope
Iron and Steel				
March, 1922....	106	113,108	$4,993,676	$44.15
April, 1922.....	106	120,744	5,367,176	44.45
April, 1921.....	108	112,492	5,942,455	52.83
*Automobiles**				
March, 1922....	45	86,642	5,337,120	61.60
April, 1922.....	45	92,132	6,499,725	70.55
April, 1921.....	43	87,069	6,089,577	69.94
Car Building and Repairing				
March, 1922....	63	58,194	3,388,262	58.23
April, 1922.....	63	58,338	3,345,982	57.36
April, 1921.....	63	51,331	3,522,583	68.62
Total Metal Workers				
March, 1922....	214	257,944	13,719,058	53.19
April, 1922.....	214	271,214	15,212,883	56.09
April, 1921.....	225	250,892	15,554,615	62.00

*Payroll figures are reported as "weekly"; they have been made "half-monthly" by multiplying by 2 1/6.

JAPANESE COPPER DUTY HIGH

To Protect Domestic Mines Duty Raised 82 Per Cent—Government Buying of Steel Continues

NEW YORK, May 29.—Japanese trade is still largely confined to the Government and large consuming interests. This business alone, however, serves to keep most of the large Japanese export branches in New York busy. The 10,500 ton rail order received by the Mitsubishi Shoji Kaisha from the Imperial Government Railways, has been placed with the Consolidated Steel Corporation. The usual quarterly tin plate requirement of the Nippon Oil Co., totalling 28,000 boxes, is reported to have been awarded in the United States. Award of the 49 miles of 70-lb. rails and 50 miles of 60-lb. rails for private interests in Japan, bidding on which closed May 12, was postponed to May 30. Takata & Co., 30 Church Street, New York, recently received an order for about 1500 tons of 60-lb. rails from a private interest in Japan. The 363 tons of structural steel for a bridge for the Imperial Government Railways was awarded to Suzuki & Co., New York. The Government railroads are receiving bids on material for building 40 locomotives in Japan. There are several small inquiries for light rails (30-lb. and lighter) in the market from private buyers.

The new duty in force on imports of copper into Japan, since April 1, is considered by some exporters as probably of only temporary duration, as the duty is practically prohibitive. Japan has recently been the third largest buyer of copper from American producers. Under the new tariff, a duty of 7 yen ($3.32) per 100 kin (132 lb.), or over 2½c. per lb., is exacted, compared with the old duty of 1 yen 20 sen ($0.57) per 100 kin, that is a duty nearly six times as much. The new tariff was enacted as a protective measure for the copper mining industry in Japan, which formerly supplied domestic needs and exported copper to China. High production costs in this industry, as in others, prevented profitable competition with American copper, and the mines have only been able to operate in a small way since Japanese and Chinese buyers turned to purchasing the American product. In addition, there is held in stock in Japan about 15,000 gross tons of copper, a large portion of which is of American origin.

WORK HOURS IN GERMANY

Limitations by Law Apply to All Operations — Three Shifts in Steel Works

Hours of work in German factories and workshops were provisionally limited by the order of Nov. 23, 1918, promulgated at the time of the revolution. This order should be regarded as an emergency regulation, which is to be replaced by an act, the first draft of which appeared in the *Reichs-Arbeitsblatt*, Aug. 31, 1921.

Daily and Weekly Maximum Hours

The German order limits the working day for workers in all industrial establishments to 8 hr. It fixes no weekly limit, but this results automatically from the establishment of the daily maximum, in view of the fact that since 1895, under Section 105 (a-h) of the industrial code, Sunday work has been prohibited for all workers in industrial establishments, with certain specific exceptions. In the great majority of establishments, to which these exceptions do not apply, the working week is thus limited to 48 hr. In the remaining establishments, which are mainly those carrying on continuous processes which must operate on Sunday as well as weekdays—for example, iron and steel and sulphuric acid works and electric light and power stations—the working week is limited to 56 hr.

Shift System in Continuous Processes

A working week of 56 hr. in no way interferes with continuous processes if the three-shift system is adopted, since three shifts of 56 hr. equal 7 days of 24 hr. each. To facilitate the regular alternation of shifts, Section 9 of the German order provides that a worker may, once in three weeks, work 16 consecutive hours, always on condition that during the three weeks he has two rest periods of 24 hr. each. The working hours of a shift may therefore be regulated as follows:

First week, 7 shifts of 8 hr. = 56 hr.; second week, 6 shifts of 8 hr. = 48 hr.; third week, 6 shifts of 8 hr. + 16 hr. = 64 hr.

In practice, this system is sometimes applied, but a large number of the establishments affected carry on their continuous processes by means of three shifts, supplemented by additional workers, so that no worker is employed for more than 48 hr. per week on the average.

Metal Working Industry

The normal working week in this industry ranges from 44 to 48 hr. The national collective agreement fixes the working week at 48 hr., if a shorter period has not been fixed by local agreement. These local agreements may provide for a working week of 46½ hr., as at Berlin; 46 hr., as in Saxony (except in the country), in Bavaria (i.e., Munich, Augsburg, Nuremberg, and Fürth), and in Würtemberg; or 48 hr., as in the naval shipyards of the Baltic and North Sea coasts and in the Rhineland and Westphalia, which cover the whole Ruhr basin. There are some large factories, however, where the working week is shorter than the maximum so laid down. At Nuremberg, for example, the large engineering works operate only 45 hr. per week. The two-shift system is adopted wherever necessary, if the workers required are forthcoming. It is most frequently found in the naval shipyards of the Baltic and North Sea coasts. The three-shift system is quite exceptional.

Overtime practically does not occur in the naval shipyards on the Baltic and North Sea coasts and at Berlin. The same holds good of the large engineering works of Saxony, Bavaria, and Würtemberg. On the other hand, some bicycle, typewriter and nickel ware factories work 5 to 8 hr. overtime per week in certain departments. In the Ruhr district and in other parts of Prussia, for example Halle, a great many factories have been working 5 to 10 hr. overtime per week for some months. Certain other exceptions to the normal working week may be mentioned. When the assembling of parts is done outside the factory, as is especially the case in the manufacture of heating apparatus, the 48-hr. limit is exceeded and 10 hr. is the usual working day. Blacksmiths in the agricultural district are allowed to work 10 hr. a day in summer and 9 hr. in spring and autumn.

Note: This is an excerpt from a translation by the International Labor Office, Geneva, Switzerland, of the report of a Dutch commission of inquiry into hours of labor in Germany.

The Finnish Railway Administration is reported to have purchased 15,142 tons of 43 kg. and 30 kg. rails from the Société Anonyme des Acieries d'Angleur, Tilleur-Lez-Liège, Belgium, at a total price of about 24,000,000 Finnish marks, which are worth at present about 2c. The heavier rails, according to the Bureau of Foreign and Domestic Commerce are for use on the Riihimaki-Viborg line for retracking, to make this line the same as the German trunk lines. There were 23 bidders for the contract. The Belgian company offered to make delivery during the summer.

At its annual banquet recently the Detroit Foundrymen's Association elected the following officers for the coming year: Fred Erb, Packard Motor Car Co., president; K. C. Babo, Dodge Brothers, vice-president; D. R. Hay, Murphy Iron Works, secretary; James G. Mendenhall, Detroit Foundry Co., treasurer.

Jobbing Trade Sees Up Grade in Steel

(*Continued from page* 1521)

establishing of a dual base. Distributers would move away from the basing point and instead of selling on a uniform base would have to sell at a higher price than that which maintains at the basic center. He expressed apprehension lest disturbance of the Pittsburgh base would mean the establishment of bases at Chicago, Duluth, Minn., and Birmingham, Ala., as well as the fixing of f.o.b. mill prices. Mr. Orr said that a uniform base means stable prices and is for the best interest of all. Even if the Pittsburgh base were changed, once the market became firmer "we probably would return to our first love."

A letter from H. F. Perkins of the Wisconsin Steel Co. was read by W. L. Niekamp, Beck & Corbitt Iron Co., St. Louis. Mr. Perkins wrote that the general impression seems to be that if other bases were established, the price would be the same at all the points, when as a matter of fact this would not be the situation. The customer surely cannot expect that the Government will fix the price of steel. Abandonment of the Pittsburgh base, the letter said, would mean that no one could tell, as at present, what steel is costing competitors. Mr. Niekamp said that very few jobbers in the West are favorable to two basing points. Some want to buy on a Chicago base and sell on a Pittsburgh base, which, he declared, is a selfish proposition. He granted that the Western fabricators had made out a strong case for a dual system in showing the added cost entering into the steel in a building in Chicago as compared with that in Pittsburgh. Mr. Niekamp hoped the Pittsburgh base would continue.

President Wheeler believed the Pittsburgh base to be the normal way of doing business and that it would be unfair to upset it, since mills have been located under the protection of the Pittsburgh rate. After all, he said, the Pittsburgh base is as advantageous to the structural mill outside of the Pittsburgh district as to the mill in that district. The statement was made by other speakers that if the Pittsburgh base is to be abandoned it would be only fair to establish f.o.b. mill prices uniformly, so that there could not be a charge of discrimination in favor of certain centers with basing points.

Trade Conditions

In the report by Chairman E. McK. Froment, New York, of the Iron and Steel Committee, reference was made to the improved business conditions and the hope was expressed that those who determined prices will recognize that "moderation is the handmaid of prosperity." Caution against inflation was also sounded by the committee. The report pointed out that during the war the Government threw away laws which destroyed efficiency and asked why this could not be done in peace time as well. It was stated that there seems to be an awakening by men in the Government to the fact that this can be done in peace times, and in this connection the report urged team work between the Government and business such as existed during the war. Complaint was made that the price spread now allowed warehouses does not show a fair profit. This view was taken by several speakers, including John B. Carse, Ogden & Wallace, New York. Mr. Carse said that the spread between cost and warehouse selling price, instead of being increased, had been cut down and in a general way is about $12 per ton. The prevailing opinion, he said, is that this does not cover the cost of handling iron and steel for warehouse distribution and he urged the warehouses to exert their efforts to get an increase in the spread.

Illustrating his remarks with numerous charts, John A. Penton, president of the Penton Publishing Co., Cleveland, spoke optimistically of the business and industrial outlook. Mention was made of the revival of the steel trade and it was predicted that within twelve months there will be a shortage of raw materials.

Secretary of Commerce Hoover explained the reorganization of the Department of Commerce in order to develop it so that it could meet demands for service from the business interests of the country. He referred particularly to the newly established commodity groups of the Bureau of Foreign and Domestic Commerce, the new plan of gathering trade statistics by the Bureau of Census and its increased work in connection with census figures and also the greater co-operation between the Bureau of Standards and the business interests of the country. The Secretary reiterated the need for legislation permitting legitimate trade associations to operate without fear of interference from the Government so long as they were within the law. He asked the convention to give consideration to this matter and emphasized the point that the Government does not care to interfere with business, while it can co-operate and assist in the development of business and in lifting its ethical standards.

Cold Finished Steel Trade

An unusually interesting paper on "The Cold Finished Steel Industry and Its Relation to the Jobber" was presented by President E. L. Parker of the Columbia Steel & Shafting Co., Pittsburgh. Mr. Parker, who urged closer understanding between the manufacturer and the jobber, gave a brief outline of the development of the cold finished steel industry since its inception commercially about 35 years ago, when the product was termed "cold rolled" because it was then used almost exclusively for shafting for the transmission of power and the manufacture of machinery, machine tools and farm implements. At that time there were a few manufacturers, and the principal process employed was cold rolling. Mr. Parker explained that the industry is now referred to as the "cold finished steel industry," and instead of a few manufacturers there are about 25 with a total productive capacity of over 750,000 tons per year. This industry has grown more rapidly, measured in tonnage, than any other branch of the iron and steel industry. The principal process now employed, as for the past 25 years, is "cold drawing" and a wide variety of uses of the product has been developed. Shafting, particularly for the transmission of power, was once the leading product, but to-day it is less than 5 per cent of the total tonnage, the direct application of electric power to machinery having materially reduced these requirements. But there is more than compensation in the many purposes for which cold finished steel bars are used in the manufacture of electric motors and the various methods by which power is directly applied to machinery.

Mr. Parker referred to the advent of the automobile, motor truck and motorcycle, the application and common use of typewriters, calculating machines, cash registers, etc., for business expediency and efficiency, many electric household utility devices, practically all of these within the last 25 years. As quantity production for these uses became necessary, automatic machinery was designed and because of the results produced by cold finishing such material is used very extensively. Twenty years ago the productive capacity was little more than 100,000 tons per year; 10 years ago less than 350,000 tons; to-day 750,000 tons. Since the latter part of 1915 the capacity has been fully engaged, with the exception of the depressed period from which the industry is now emerging.

Cold finished steel bars are now produced by three methods—cold drawing, cold rolling and turning, the same general result as to finish, accuracy in size, straightness, etc., being produced by the three processes. This, it was explained, does not mean that one product is as good as another for all purposes. By the cold drawing and cold rolling processes tensile strength and elastic limit are greatly increased, although the results vary somewhat according to the process employed; whereas the turning process, since it does not affect the structure of the steel, does not change the physical characteristics of the original hot rolled steel bar.

Mr. Parker spoke of the work of societies and associations in standardizing steel specifications during the past 15 years, with the result that there is now a specification for practically every purpose. He said that as compared with other branches of the industry cold finished steel manufacture requires more capital investment in raw and finished material. In order to meet

the demands from the jobbing and various consuming trades the manufacturer is required to carry, theoretically at least, a stock consisting of over 100 different sizes, grades and lengths, reference being made to standard sizes only. Variations in dimensions are often measured by a fraction of 1/1000 in. Over a period of approximately 12 years, Mr. Parker said, the average base spread per ton between hot rolled steel bars and cold finished steel bars has been about $13, out of which must come the cost of manufacturing. During the period in which the United States participated in the war this industry supplied nearly 1,000,000 tons of cold finished steel bars for the manufacture of shells, army trucks and tractors, airplane parts, etc.

In urging closer co-operation and sympathy between the manufacturer and the jobber, the speaker suggested less tendency to speculation. In conclusion he said:

> What is the relation of this industry to the jobber, the members of this association and others of its kind? As nearly as can be estimated, about 10 per cent of the production, or approximately 75,000 tons per year, is handled by jobbers; that is, through warehouses and stores, and another 5 per cent, or nearly 40,000 tons per year, is shipped direct for the jobber to his customer. In other words, through you, the jobber, is distributed 15 per cent of the total production, which is nearly the capacity of any one of the largest producers or, to make another comparison, more than the productive capacity of the entire industry twenty years ago. Obviously, your relation to the industry is an important one, as next to the automobile and possibly the farm implement industry, you are the largest buyer, and through you only can the manufacturer reach certain classes of trade and provide distribution for the many purposes for which this material is now used on an economical basis.

From the Jobber's Standpoint

A. J. Lockwood, Edgar T. Ward's Sons Co., Newark, N. J., as chairman, presented the report of the Committee on Cold Finished Steels. He said that stocks today were normal and that where low prices prevail they apply to the lower grades of material that have not been quite absorbed. It was suggested that highly finished steel called for better prices than some that have been received. There were not enough cold rolled orders last year to employ 10 per cent of the capacity. There have been unnecessary rejections and in the matter of straightness some customers expected hand picked tonnage without paying the necessary extras. The present, it was declared, is a good time to turn to sound sales practises and to be mindful of the interest of jobbers, producers and consumers alike.

Warehousing on the Pacific Coast

H. L. Simon, Foucar, Ray & Simon, Inc., San Francisco, in a discussion on "The Steel Trade on the Pacific Coast," pointed out that the warehouse trade is conducted entirely differently in the West than in the East. He explained that in the West there are not the manufacuring facilities, as they are understood in the East, and that trade is largely with the lumber and mining industries, although latterly there has been trade with the shipbuilding industry. He said that it is necessary for the Pacific Coast jobbers to carry stocks so that consumers can get it immediately without waiting for shipments from mills in the East. Freight rates constitute about 75 per cent of the cost and customers cannot buy from the mills profitably unless tonnage is taken by the carload, which, it was stated, is not practical. It was stated that perhaps the jobber on the Pacific Coast plays a more important part in distribution than jobbers in other sections of the country, because the former has to carry such a wide diversity of stocks. He added that the Pacific Coast jobber does not have any difficulty with the mills regarding differentials.

S. D. Latty, Kirk-Latty Mfg. Co., Cleveland, discussing the bolt market, said that the shelves of jobbers in the South are empty and that if the agricultural interests come into the market there will be a big demand. He said that the railroads are buying freely and are using large quantities of bolts in repairing wooden cars. Mr. Latty said that bolt manufacturers are justified in increasing prices and that all of them lost big money last year and have now planned to build up gradually a sane market. Mr. Latty said that he anticipates a shortage of labor and that he expects labor costs to advance in the steel industry and also predicted higher prices of raw materials for the manufacture of steel. Necessarily, it is pointed out, this will mean higher prices for bolts and other manufactures of steel. Mr. Latty said that the bolt industry about two weeks ago was operating at 90 per cent of capacity and to-day is operating at full capacity. He cautioned against a runaway market and in speaking of labor said that employers should live close to their workmen.

Suggestions were made by other speakers that bolt manufacturers should charge extras for broken lots. Brief discussions made regarding the market for chains, drive calks and horseshoes all sounded a tone of optimism.

Discussion on Thursday morning of the subject, "Back to Normalcy—What is 100 Per Cent?" brought out the thought that it is not possible to say exactly what is "normalcy." It was asserted that there is no such thing as "normalcy" in the steel trade, and that the term "prince or pauper" as used by Andrew Carnegie is still descriptive of the industry. Approval was given the statement that normalcy, like General Hancock's description of the tariff, can be called a local issue because conditions fluctuate differently in the various sections of the country. The statement of Mr. Simon that normalcy should be figured on invested capital plus a fair return was approved by Mr. Wheeler and others. It was conceded that volume must increase over pre-war conditions if normalcy is to obtain and that wages instead of returning to those paid before the war will increase. Mr. Niekamp said that he believed common labor in warehouses will be getting 40c. to 50c. per hour within two years, but there was dissent from this view. Mr. Niekamp based his prediction partly on the fact that immigration has been limited.

New Officers

Officers were elected as follows:

President—W. L. Niekamp, Beck & Corbitt Iron Co., St. Louis.

First vice-president—John B. Carse, Ogden & Wallace, New York.

Second vice-president—C. R. Williams, Williams Hardware Co., Minneapolis.

Executive committee—For three years, H. C. Busch, Cincinnati Iron & Steel Co., Cincinnati; for one year, A. C. Dietrich, E. Scott Payne Co., Baltimore.

The selection of the place of the next convention was left to the executive committee.

Canadian Iron and Steel Output in April

Pig iron production in Canada during April declined 9000 tons from the output report in March, but an analysis of the output shows that 5000 tons more of iron were produced for direct sale, than in the previous month. The total pig iron production amounted to 32,572 gross tons, comprising 12,142 tons of basic, 14,952 tons of foundry and 5478 tons of malleable.

The decline in the production of steel ingots and castings in Canada noted in March report was further accentuated during April, the total ouput declining to 21,933 tons, as compared with 29,941 tons in March. The production of steel ingots and castings for April was the lowest on record and amounted to only 24 per cent of the average production in April during the 10 years 1911-20. The ouput of steel ingots and castings in April, 1921, also established a low record for that year at only 27,000 tons.

Total number of unemployed in Pennsylvania on May 15 as estimated by the State Board of Labor and Industry was 190,055 as compared with 215,410 May 1 and 321,893 on Jan. 1, the peak of unemployment.

The National Transit Pump & Machine Co., Oil City, Pa., has an order for 18 pumps for the Standard Oil Co. of Louisiana.

Refractories Demand Is Much Improved

PITTSBURGH, May 29.—As the strike of the coal miners has failed to seriously affect steel works operations, and steel manufacturers have found a means of providing for their fuel requirements in sufficient volume to maintain plant activities, there has been a considerable increase in the demand for refractories. This has brought a marked quickening in the operations of brick plants, the current rate being placed at 60 to 65 per cent of normal capacity, the highest point reached in more than a year. This improvement does not reflect any change in the buying policy of consumers, who still are buying supplies as needed; their needs, however, are greater in keeping with the demand for steel and the fact that steel plants everywhere are fairly busy.

The effect upon refractories prices of the greater demand is seen in a virtual disappearance of some of the low prices which recently have been quoted on fire clay and silica brick. There are still occasional sales of Pennsylvania high duty fire clay brick at $30, but this price is being made only by one or two makers, and then on what might be termed attractive business. Prices of less than $30 on Pennsylvania silica brick have disappeared. The coal strike so far has had no effect upon the production of refractories, but there are some producers of silica brick who have to buy their coal and if obliged to pay current prices would be under the necessity of obtaining higher prices to make a profit.

The monthly statistical report of the Refractories Manufacturers' Association for April has been issued. It shows that production of fire clay brick declined slightly in that month as compared with March, and that shipments were at about the same percentage as at the end of the previous month. Stocks showed a slight gain. Expressed in percentages, the production was about 52 per cent of monthly economical producing capacity, and shipments about 49 per cent and stocks 191 per cent. New orders, minus cancellations, were 59 per cent of monthly economical producing capacity, an increase of 4 per cent over the previous month, while unfilled orders rose from 40 per cent at the end of March to 50 per cent at the end of April.

Silica brick statistics showed a substantial gain in shipments and, since there was not an attendant increase in production, stocks declined slightly. April production was about 36 per cent of monthly economical producing capacity, shipments 39 per cent, and stocks about 132 per cent. New orders during April amounted to 50 per cent of capacity, a clear gain of 20 per cent, while unfilled orders, which stood at 45 per cent of capacity at the end of March, were about 55 per cent at the end of April.

We quote per 1000 f.o.b. works:

Fire Clay	High Duty	Moderate Duty
Pennsylvania	$32.00 to $35.00	$30.00 to $32.00
Ohio	30.00 to 35.00	28.00 to 30.00
Kentucky	32.00 to 35.00	30.00 to 32.00
Illinois	32.00 to 35.00	30.00 to 32.00
Missouri	32.00 to 35.00	28.00 to 32.00
Silica Brick		
Pennsylvania		30.00
Chicago	35.00 to	37.00
Birmingham		40.00
Magnesite Brick		
Standard size per net ton (f.o.b. Baltimore)		53.00
Grain magnesite per net ton (f.o.b. Baltimore)		28.00
Chrome Brick		
Standard size, per net ton	40.00 to	42.00

Hearing on Pittsburgh Base Nearing Close

CHICAGO, May 27.—After a recess of a week, hearings on the Pittsburgh basing point were resumed before the Federal Trade Commission here on May 22. Among those who testified during the course of the week were James H. Broad, treasurer Cyclone Fence Co., Waukegan, Ill.; William J. Stoutt, president Independent Can Co., Chicago, and Frank Voightman, president Voightman & Co., Chicago, manufacturer of ornamental iron and steel doors and windows. The local hearing is expected to close by the end of next week. Birmingham will be the scene of the next hearing in the case.

WAGE REDUCTIONS

Labor Board Cuts Pay of Maintenance of Way Men

CHICAGO, May 28.—Reductions amounting to about $48,000,000 from the wages of 400,000 railroad employees were ordered in a decision by the United States Railroad Labor Board to-night.

The decreases, which averaged 5c. an hour in the majority of cases, followed cuts of $400,000,000 made last July by the board. To-day's decision, however, affects mostly maintenance of way workers, although decisions are pending affecting other classifications.

If the wage cuts made in the latest decision are extended to other decisions expected soon, it was pointed out in railroad circles, much of the $600,000,000 increase given by the board in 1920 will be wiped out and wages restored to a level which railroad officials have told the board will lead to a new era of development and open the way to the employment of 200,000 men.

The decision was signed by the three railroad members of the board and the three members representing the public. A dissenting opinion was filed by the three members representing the labor group. The majority opinion said that the wage cuts, effective on July 1, were made in accordance with decreases in the cost of living. The minority opinion contended that the wage scale provided in the decision was insufficient to sustain life on the basis of American standards.

Western Railroads Demand 10 Per Cent Cut

CHICAGO, May 27. — Executives of railroads with headquarters in this city have joined in a demand that railroad wages be cut in proportion to the 10 per cent reduction in freight rates ordered by the Interstate Commerce Commission. It was declared that unless this is done, the decreased income of the roads under the rate reductions will prove disastrous and general business conditions will suffer rather than improve. In comment, Samuel Felton, president Chicago Great Western Railroad, said in part:

"My understanding of the situation is that voluntary reductions in rates made by the railroads and by the commission combined, since the order of Aug. 26, 1920, total in the case of the Great Western 14½ per cent of the freight earnings. It would seem fair to assume this percentage reduction as applying in the territory between the Missouri River and Chicago at least. Such a reduction will not enable the railroads to earn 5¾ per cent on the value of their properties as fixed by the commission."

"The Railroad Labor Board has no power to act in the matter of wages of railway employees, except when the question is presented to it by the carriers or the employees," said Ben W. Hooper, chairman of the board. "Wage disputes affecting most of the carriers are now pending before the board, involving applications for increases on the part of some classes of employees and applications for reductions upon the part of the carriers. The evidence and arguments were concluded some time since, and the board is now busily engaged, two sessions each day, in the consideration of these disputes and the formulation of its decisions. These decisions will be based upon evidence presented to the board as the law requires, and not upon the action of the Interstate Commerce Commission in the matter of rates. As a matter of fact, the board had already formulated one decision covering the wages of one class before the decision of the Interstate Commerce Commission was announced."

The blast furnace of the St. Louis Coke & Chemical Co. at Granite City, Ill., made its best record in April at 15,441 tons, or 514.7 tons per day. The coke consumption was 1791 lb. per ton of pig iron.

Norway has notified the International Labor Office at Geneva of the final enactment of a law forbidding strikes, requiring the compulsory arbitration of labor disputes, and providing the machinery therefor.

Railroad Rate Reduction Not Adequate

Such Is Opinion of Iron and Steel Manufacturers—Decision of Interstate Commerce Commission Not Harshly Criticised

BY L. W. MOFFETT

WASHINGTON, May 30.—The horizontal reduction of 10 per cent in railroad rates, effective July 1, is unsatisfactory to the iron and steel trade. At the hearing in connection with the general rate case, whose finding was handed down last Wednesday by the Interstate Commerce Commission, the iron and steel producers for the most part asked for the complete removal of the general advance of Aug. 26, 1920, amounting to 40 per cent in the East, 35 per cent in the West and 25 per cent in the South. To have removed the advance of 40 per cent in the East, a reduction of 28 per cent would have been necessary, as against the 10 per cent cut ordered throughout the country, to apply to all freight except agricultural products, livestock and in certain other instances where reductions had been previously ordered by the commission.

The attitude of the iron and steel trade is similar to that of other shippers of basic products, such as coal, building materials, etc. The view was expressed by some iron and steel makers at the hearing that a 10 per cent reduction would not originate an additional pound of steel, but others thought it would help. The industry, according to a statement of Chairman John A. Topping of the Republic Iron & Steel Co., before the commission, is responsible for a traffic volume of about 168,000,000 tons per annum, with one ton of outbound movement to five tons inbound. It is estimated that present freight charges represent 50 per cent or more of iron and steel values and, roughly, constitute about 66 2/3 per cent of the average cost of ore in the Mesabi district.

Will Mean Little

It is consequently pointed out that a reduction of 10 per cent in freight rates will mean comparatively little to the iron and steel industry and cannot be reflected in prices. At the same time, a widespread reduction of 10 per cent in rates will mean a big loss to the railroads unless it is offset by stimulated traffic. A substantial reduction in rates on basic commodities, including iron and steel, it is pointed out, would have reflected lower prices and thus mean a real advantage to the carriers, the largest consumer of steel. The railroad executives also have expressed disappointment at the decision which provides for an annual return of 5.75 per cent and claim it will injure the securities market and should not have been proposed until wages have been reduced, the question of wages being before the Labor Board. Reduction of wages of maintenance-of-way men, now ordered, will partially offset the rate reduction.

While the decision of the commission was unanimous that a rate reduction should be made, there were dissenting views by commissioners as to how it should be brought about. Commissioner Lewis said that "there are commodities and raw materials that are basic to existence, to industry, and to readjustments, on which transportation charges are relatively and absolutely too high. They are out of proper relationship to the selling prices of the commodities and constitute not only maladjustments at home but most unfavorably affect us in world competition." Commissioner McChord said that he thought "that times and conditions plainly demand reductions in rates on all materials and products that are basic in industry and in our existence as a people to a level that business interests will recognize as the lowest available for some time to come. Nothing less will quiet the prevalent unrest and agitation for lower transportation costs and encourage the needed healthy flow of traffic. The more nearly we approximate the admissible limits of reductions the more effectually will we obtain that stabilization of rates which is conceded to be essential to a full and country-wide resumption of business. In my judgment, the general reductions now decreed fall short of full attainment of the desired end. The record convinces me that the present level of rates on the basic articles is now operating as a serious burden upon commerce and should be materially reduced, and that upon a considerably lower level of rates, with an induced higher level of traffic activity, not only will the carriers secure more net revenue but the prosperity of the country as a whole will be greatly enhanced."

The Administration's Attitude

The Administration also, it has been rather plainly indicated, favored reductions on basic commodities with perhaps increases on certain of the higher class rates. Railroad executives are said to have made it known to the President that they could not see their way clear to voluntarily make such reductions and it is assumed that they prefer the reductions made by the formal decision, without entering an order, than they would be if they made substantial cuts on selected commodities. The majority of the commission felt that inasmuch as the rates had been horizontally increased they should be lowered in a similar manner. As a result, the increases over rates existing prior to the general advance of Aug. 26, 1920, will be 26 per cent instead of 40 per cent in the East; 21.5 per cent instead of 35 per cent in the West and 12.5 per cent instead of 25 per cent in the South. Some interest is being manifested as to the attitude of the carriers regarding the request of the commission that they advise it promptly, "and not later than May 31, 1922, if possible, whether the findings herein will be carried into effect without formal order or orders by us," but as indicated it is believed the carriers will accept the findings instead of suggesting entering into further discussions at this time regarding rate reduction. However, the carriers already are complaining of the proposed net return basis.

Improvement in Industry

In discussing its attitude as to rates on specific commodities, the commission report takes notice of the fact that since the hearing the general case of the iron and steel industry has materially improved. It discusses the coal market and prices, rates, etc., and treats raw products in the iron and steel industry similarly. It is stated that "Except in particular situations, or to the extent that rates on one or more raw materials are from a transportation standpoint too high as compared with rates on others, it would appear that reductions in rates on raw materials should, in so far as possible, be made upon all alike." By some men in the trade this is interpreted to mean that if the commission concludes that existing rates on coal, coke, and ore are now in their proper relationship, the rates on one commodity will not be changed without a corresponding adjustment in rates on the others. As is known, the commission now is investigating the relationship between rates on upper lake ore to interior furnaces and coal and coke rates to the Buffalo district. The decision itself is taken to mean that the 10 per cent reduction in ore rates will not be applied to shipments from the mines to the upper lake docks, inasmuch as there was no increase in rates on this movement when the 40 per cent advance went into effect on Aug. 26, 1920, but that the reduction will apply to all other ore hauls.

Reduction in Steel Cost

It has been calculated that the 10 per cent reduction on ore, limestone and coal will mean a cut of 88.2c.

per ton in the production of steel, aggregating an annual saving for the industry of $31,680,000, based on an average output of 36,000,000 tons of ingots and steel castings. This, it is stated, would be of no great aid to the industry. By applying the 10 per cent cut to beehive coke and merchant by-product coke the saving would be increased. The greater portion of beehive and merchant by-product coke goes to merchant blast furnaces, smaller iron and steel plants, and foundries, the larger steel works getting the benefit of cheaper by-product coke, made in their own ovens, by reason of the cut in coal rates. The average coke rate is estimated at $2.83 per ton. The average rate on ore is figured at $1.20 per ton, and two tons being required to make one ton of iron, this means a saving of 24c. a ton in the cost of blast furnace operations; $2.27½ per ton is the average freight rate on coal—which pertains to all sources of consumption and not to the iron and steel industry alone—but using this figure and estimating 2½ tons of coal in a ton of steel, including blast furnace and motive power consumption, this reduction is equivalent to 56.7c. per ton; the average rate on limestone is placed at $1.50 per ton and figuring 1300 lb. of this flux to a ton of iron, the reduction in cost on this item would be about 7c. These totals have been worked out merely as a means of giving what is considered an approximate saving to the industry and not as an exact calculation.

Railroad Officials Meet

After a meeting last Thursday between railroad executives and members of the Interstate Commerce Commission at which the rate reduction was discussed it was announced by the executive chairman that railroad officials will hold meetings in all parts of the country this week to consider the reductions. The railroad committee called on President Harding and thanked him for "his interest in the general subject."

There is a general feeling that the rate situation cannot be definitely determined upon until the railroad labor question is settled but that the cut of 10 per cent being unsatisfactory to large shippers may result in demands for many hearings involving basic commodities, particularly in an effort to get a great reduction on them. It is freely conceded that the commission had an extremely difficult problem to handle and while disappointment is felt by many that the cuts were made on a horizontal basis instead of being applied to heavy loading products and the reductions made greater, there has been an absence of any harsh criticism of the commission. Talk of a "railroad holiday" is not taken seriously.

EXTENSIVE PLANS

Mahoning Valley Companies Consider Building New Plants

YOUNGSTOWN, May 30.—Plans to strengthen their position in the steel markets are being formulated by the Youngstown Sheet & Tube Co. and other independents in the Mahoning Valley district. Compilations for the original seven-company merger indicated the fact that the Chicago district enjoys a substantial freight rate advantage to shipping points in the Southwest over plants at Youngstown. Hauling charges on pipe, for instance, which constitute the greater percentage of shipments to the Southwest from both districts, range from $4 to $7 per ton less from Chicago than from Youngstown.

Steel manufacturers at Youngstown are considering a number of expedients to overcome this disadvantage and equalize conditions. One plan, seriously considered by the Sheet & Tube company, has been the establishment of a Western plant in the Chicago district. A site for such a project has been under option.

Another alternative has been the construction of a railroad by Valley plants from the Ohio River to Youngstown and possibly extended to Lake Erie. Lately this proposal has received serious consideration. Such a road, privately owned, would not only handle coal and ore, but would serve as an outlet for shipments of semi-finished and finished steel to Southern and Southwestern points.

There would be a large water haul for such shipments, manufacturers point out, on the Ohio and Mississippi rivers. Such transportation, being cheaper than rail haul, would equalize freight charges to points of destination and would place Valley producing interests in better competitive position with Chicago makers. This would apply particularly to pipe, heavy tonnages of which move from the Youngstown district to the Southwest.

The Sheet & Tube company, for example, has a tube mill installation capable of producing approximately 650,000 tons of finished pipe per year. Its organization for distribution and service to customers includes a subsidiary concern, the Continental Supply Co., with headquarters at St. Louis. It operates more than 60 separate stores, affording close contact with users of pipe in territory where oil and gas production is an important industry. Through this organization, the parent company's operating department is assured of accurate information concerning special requirements of customers, any change in current practice or any new methods in the use of pipe or its adaptations to uses in new ways.

The Republic Iron & Steel Co., another important independent pipe maker, has its principal property at Youngstown.

Plans for installation of equipment to manufacture full finished sheets and thus cater to the automobile trade are being developed by a Valley independent now without such specialized equipment. More diversified output is the aim of a number of Valley interests which have been considering merger plans.

To Survey Simplification in Manufactured Products

At the request of Secretary Herbert Hoover of the Department of Commerce the American Engineering Standards Committee will undertake at once a canvass to determine what simplification in manufactured products is most needed and most desirable. This canvass will be conducted through the engineering and technical bodies having representatives on the committee or co-operating in its work. The survey of simplification or standardization needs and possibilities will extend into almost every industry in America.

This assignment to the American Engineering Standards Committee is one of Secretary Hoover's steps to retrieve for American industry some of the money wasted, as revealed in the report on waste in industry which was made not long ago by a committee appointed also by Mr. Hoover while he was chairman of the Federated American Engineering Societies. The latter committee found that waste in industry was due largely to an over-multiplicity in number of products as well as to inefficiency in process.

Of equal significance is the fact that Mr. Hoover's request that the American Engineering Standards Committee conduct this survey and the acceptance of the assignment by the committee indicate a co-ordination of the work in the simplification of manufactured products, sponsored by Secretary Hoover, and the work of the American Engineering Standards Committee in the unification of standards on a national basis.

Activity in Steel Sheets

Advance details from the Survey of Current Business, by the Department of Commerce, show the following figures relating to blue, black and galvanized sheets, each item being expressed in percentage of capacity:

	April, 1921	March, 1922	April, 1922
Production	34.5	68.0	75.2
Unsold stocks	16.4	18.7	13.9
Shipments	35.7	61.1	72.3
Sales	36.9	111.4	107.7
Unfilled orders	112.3	128.7	161.0

PERSONAL

A. K. Hacke, Broken Hill Proprietary Co., Ltd., iron and steel, Newcastle, Australia, was a guest at the meeting of the American Iron and Steel Institute.

Major J. M. Campbell, J. Wild & Co., Ltd., Middlesbrough, England, is taking a trip through the Lake Superior ore districts.

Louis F. Vonier, formerly sales engineer, Federal Bridge & Structural Co., Waukesha, Wis., has been appointed district representative, Lyon Metallic Mfg. Co., Aurora, Ill., with headquarters at Milwaukee, Wis.

G. T. Overholt has been transferred from the Burlington, N. J., works of the United States Cast Iron Pipe & Foundry Co., to the western sales office at Chicago, where he will be a member of the sales force.

Marvin E. Monk has been appointed assistant sales manager in charge of general sales, United States Ball Bearing Mfg. Co., Chicago. Mr. Monk was formerly special sales engineer, Manning, Maxwell & Moore, Inc., New York.

William Dette of Crocker Brothers, New York, sailed with his family on May 26 on the Patria for Naples, Italy, to be gone about four months, returning by way of England.

W. B. Peirce, for the past two years identified with the Peirce-Brown Co., North Tonawanda, N. Y., and previously for 12 years superintendent, the Buffalo Bolt Co., also at North Tonawanda, has been appointed works manager, the Graham Bolt & Nut Co., Pittsburgh. Mr. Peirce assumes his new duties June 1.

Charles L. Warner, superintendent of construction, Taft-Peirce Mfg. Co., Woonsocket, R. I., has resigned.

W. T. Todd, president, Somers, Fitler & Todd Co., Pittsburgh, mill and mine supplies and machinery, recently was elected first vice-president the Pittsburgh Chamber of Commerce; Harry C. Graham, president, Graham Bolt & Nut Co., Pittsburgh, second vice-president, and A. L. Humphrey, president, Westinghouse Air Brake Co., third vice-president.

Walter R. Pflasterer has been appointed agent in the Chicago territory by the Track Specialties Co., 29 Broadway, New York. Mr. Pflasterer has offices at 527 Manhattan Building, Chicago.

J. F. Motz, for a number of years Pittsburgh manager the Electric Controller & Mfg. Co., has joined the sales and engineering staff of the Factory Products Co., 204 Oliver Building, Pittsburgh.

Frederick E. Bankwits, formerly managing engineer of Fletcher-Thompson, Inc., industrial engineers, Bridgeport, Conn., has been chosen vice-president of the new Seward Wire Co., Parkersburg, W. Va., which will manufacture rubber-covered insulated wire.

A. F. Anjesky, two years in charge of sales New York district Cleveland Crane & Engineering Co., has been transferred to the plant at Wickliffe, Ohio, and will shortly open and be in charge of the new Detroit office of the company. He is succeeded in the New York office, 50 Church Street, by L. E. Salem, who has been in the New York district for some time in charge of sales of the Cleveland tramrail.

John Stambaugh, director of the Brier Hill Steel Co., Youngstown, Ohio, has returned from an extended trip to Europe.

Allen W. Dickson will assume new duties June 15 as secretary of the National Association of Building Trades Employers, with headquarters in Cleveland. For the past two years he has been secretary of the Building Trades Employers' Association at Youngstown, Ohio.

Fred Hubbard has resigned as field engineer of the Carnegie Steel Co. in the Youngstown district, to become identified with the engineering department of the Brier Hill Steel Co. He will supervise erection of the Brier Hill company's new office building, to be located opposite its open-hearth furnace department at Youngstown.

At a meeting of the board of directors of the Air Reduction Co., Inc., May 24, A. R. Ludlow, formerly vice-president in charge of sales, was elected first vice-president; M. W. Randall, formerly secretary, was elected vice-president and secretary; Herman Van Fleet, formerly chief engineer, was elected vice-president and operating manager; Dr. F. J. Metzger was elected vice-president in charge of research and development.

The board of directors of the Baldwin Locomotive Works made the following changes in the official personnel: John P. Sykes, to be senior vice-president, in charge of plants and manufacture; Charles A. Bourgeois, vice-president, in charge of manufacture; Jacques L. Vauclain, vice-president, in charge of plant and equipment; Harry Glaenzer, vice-president, in charge of engineering, succeeding Kenneth Rushton, deceased; William A. Russell, vice-president, in charge of purchases.

Homer D. Williams, president Carnegie Steel Co., has been elected a director of the Union Trust Co., Pittsburgh.

A. C. Danner of Oak Park, Ill., who has been one of the European representatives of the International Harvester Co., for 30 years, arrived in New York May 28 on the Zeeland from Antwerp. He went to Europe in 1892 after he had been with the corporation in this country for 14 years, making a total of 44 years' continuous service.

Geo. W. Scott, who recently resigned as manager of the by-products department, United Alloy Steel Corporation, Canton, Ohio, is now affiliated with the sales department of The Sheet Metal Mfg. Co., Youngstown, Ohio.

Henry O. Pond has resigned as vice-president and managing engineer, E. B. Cadwell & Co., Inc., New York.

Frank Phalen, who has been manager of sales of the New York district for the Republic Iron & Steel Co. for upward of 15 years, has resigned to associate himself with his brother, Charles G. Phalen, in Phalen & Co., In., in the Canadian Pacific Building, 342 Madison Avenue, New York, who are handling railway equipment, specialties and iron and steel products.

Francis J. Hall has resigned as vice-president of the Central Iron & Steel Co., Harrisburg, Pa., to become vice-president of the Commonwealth Trust Co. of Harrisburg, one of the largest banking institutions in Pennsylvania. He takes up his new duties on June 1. Mr. Hall became connected with the Central Iron & Steel Co. in 1902. In 1908 he was made general sales agent and in 1917 vice-president. During the war he served at Washington as a member of the American Iron and Steel Institute's committee on steel distribution.

Philip Rowe, formerly of the Hallidie Machinery Co. of Seattle, has been appointed general manager of Eccles & Smith Co., San Francisco. Mr. Rowe has had 20 years' experience in the machinery business.

Paul John Kruesi of Chattanooga, Tenn., has been appointed acting assistant Secretary of Commerce during the absence of C. H. Huston abroad. Active in Chattanooga business since 1902, Mr. Kruesi is at present president and owner the American Lava Co., the Chattanooga Elector Metals Co. and the Southern Ferro-Alloys Co.

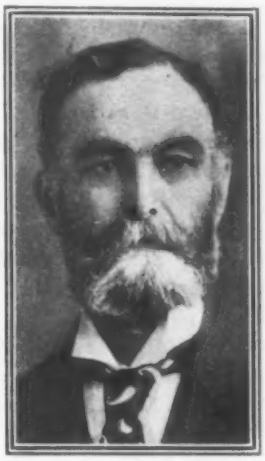
William E. Crocombe has resigned as vice-president of the Amforge Co., Chicago. Announcement will be made later concerning his future plans.

Eugene J. McCarthy, of Beals, McCarthy & Rogers, Inc., Buffalo, will sail early in June for a European trip of several weeks.

Henri A. Cardozo, Paris, managing director of Societe d'Electrometallurgie de Dives, operating important works in the brass and copper industry of France, who has been in the United States for the past two months making a tour of copper mines and copper working plants, sailed from New York for France this week.

OBITUARY

JOHN MONRO LONGYEAR, capitalist and iron mine operator, died in Boston May 28. Born in Lansing, Mich., in 1850, he received his education at Olivet College and Georgetown University. His first employment was in the lumber business as an inspector. While thus occupied, Mr. Longyear became interested in mineralogy. The study of this science, combined with an intimate knowledge of the country, resulted in the discovery of the Norrie mine in 1882. In tracing out the Gogebic range, which he did for some 25 miles, he discovered also the Aurora and Anvil mines and was subsequently able to acquire title to many square miles of this territory, interesting other parties with him in the purchase of the land. He remained in the active work of prospecting and developing until 1888, and was prominent in the exploration of other deposits especially the Menominee range. Though Mr. Longyear long concentrated his attention on the development of northern Michigan to the exclusion of other interests and was personally responsible for a large part of the progress made there, he joined with Frederic Ayer, of Boston, just before the war, in the financing of the Arctic Coal Co., which held title to the large Spitzbergen field, within 700 miles of the Pole. For many years Mr. Longyear had maintained a home in Brookline, Mass. Previously his residence had been at Marquette, Mich.



JOHN MONRO LONGYEAR

WILLIAM GLEASON, founder and president of the Gleason Works, Rochester, N. Y., died at his home in Rochester, May 24, at the age of 86 years, following an illness of about two months. Wherever machine tools are used Mr. Gleason is known as the inventor of a device later perfected for cutting bevel gears, and the machinery he so early developed probably played a large part in the development and perfection of the mechanisms of the modern automobile. Mr. Gleason was born in Tipperary County, Ireland, in 1836. At the age of 15 he went to Rochester and began work in the machine shop of Asa R. Swift. He completed his apprenticeship with I. Angell & Sons and went to Hartford, Conn., where he was employed in the Colt armory during the Civil War. In 1865 Mr. Gleason returned to Rochester and opened a machine shop, forming, not long afterward, a partnership with John Connell and James S. Graham under the name of Connell, Gleason & Graham, to make machines, tools and wood-working machinery. This partnership was dissolved in 1873, when he went with the Kidd Iron Works, which he took over in 1875. A few years later business conditions had caused him to reduce his working force from 150 men to 3, but with his back against the wall, Mr. Gleason had the courage to pull through this and subsequent business depressions and in 1896 an addition to the plant was under way. In 1910 the first group of reinforced concrete buildings of the present works was put up. During the war the Gleason Works employed 1700 men at making ordnance for the Government and expanded its production capacity to three times its immediate pre-war mark. The plant now covers over 25 acres. Mr. Gleason, whose courage and perseverance brought the firm safely through many dangerous business periods, remained president up to the last. In his later years, however, most of the business was administered by his sons, James E. and Andrew C., who are at present vice-presidents in the company.

A. L. JOSEPH, for many years connected with the Joseph Joseph & Brothers Co., Cincinnati, died recently in his 76th year.

ERNEST SOLVAY, inventor of the Solvay process for manufacturing soda ash and collaborator in the development of the Semet-Solvay by-product coke oven, died May 26 in Brussels, Belgium, aged 84 years. He had been long prominent in scientific and philanthropic activities and was often called "the Carnegie of Belgium." The Semet-Solvay coke oven originated in the effort to find a source of ammonia for the Solvay ammonium-soda process. The problem was solved by Mr. Solvay and his son-in-law, Mr. Semet, through the distillation of soft coal in a retort oven. The final development was the present Semet-Solvay oven. Mr. Solvay was head of Solvay & Co., Brussels, the parent company of both the Solvay Process and the Semet-Solvay companies.

JAMES G. LAWLER, district superintendent of the American Car & Foundry Co. plant at St. Charles, Mo., died May 24 after several years' illness. Mr. Lawler was 65 years old and had been in the employ of what is the American Car & Foundry Co. for 46 years. He is survived by his wife, five sons and two daughters.

PATRICK JAMES DOYLE, secretary Worcester Brass Co., Worcester, Mass., died last week of accidental asphyxiation, at the age of 62 years.

WILLIAM D. JAMESON, 71 years old, long connected with the steel and iron industry, died at his home in Baltimore on May 22. His death was due to pneumonia. Mr. Jameson was senior member of the firm of Jameson, McKenzie & Evans.

ISAAC JOSEPH, president of the Edna Brass Mfg. Co., Cincinnati, and also president of the Isaac Joseph Co., iron dealers, died at his home in that city on May 23, aged 62.

Leather Belting Sales as an Index

A new index to industrial activity will be available in the report of sales of leather belting from the office of the Leather Belting Exchange, Louis W. Arny, secretary, 119 South Fourth Street, Philadelphia. The exchange represents about 60 per cent of the total product. The following statement has been sent out showing sales for the week ended May 13:

First quality	43,568 lb.	$71,883.52
Second quality	5,298 lb.	7,483.74
Third quality	1,963 lb.	2 846.58
Waterproof	8,084 lb.	16,173.03
Total sales	58,915 lb.	98,386.87

The total of 58,915 lb., valued at $98,386.87, compares with 84,060 lb., valued at $139,010.94, for the week ended May 6, 1922, and with 72,699 lb., valued at $137,278.45, for the second week in May, 1921.

COMING MEETINGS

June

American Association of Engineers. June 5, 6 and 7. Annual meeting, Salt Lake City. Secretary, C. E. Drayer, 905 State Building, Chicago.

American Boiler Manufacturers Association. June 5, 6 and 7. Annual meeting, Buckwood Inn, Shawnee-on-Delaware, Pa. Secretary, H. N. Covell, 191 Dikeman Street, Brooklyn, N. Y.

American Foundrymen's Association. June 5 to 9. Annual meeting and exhibition, Rochester, N. Y. Secretary, C. E Hoyt, 140 South Dearborn Street, Chicago.

First Annual Industrial Advertising Conference. Milwaukee, June 11 to 15, inclusive. Keith J. Evans, Joseph T. Ryerson & Sons, Sixteenth and Rockwell Streets, Chicago, chairman of the conference.

American Railway Association. June 14 to 21. Annual meeting, Atlantic City, N J. (Formerly the Master Car Builders and Association of Master Mechanics.)

American Society for Testing Materials. June 26 to 29. Annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J. Secretary, C. L. Warwick, 1315 Spruce Street, Philadelphia.

Machinery Markets and News of the Works

TONE OF MARKET BETTER

Illinois Central Railroad Adds 46 Tools to List—Other Inquiries

Showing in May Better Than for Several Months—Prospective Business in Various Districts

The Illinois Central Railroad has added 46 machines to the list published in these columns last week. The tools asked for include bolt-threading machines, drill presses, screw machines, turret lathes, milling machines and other tools, details of which are given in the Chicago market report.

A new list has been issued by the Florida & West Coast Railroad, which, among other items, contains a number of drilling machines. The Standard Oil Co., Whiting, Ind., is inquiring for a set of bending rolls for 40 ft., 1¼ in. plate.

Improvement is reported from most centers, although buying is still moderate and there is still a tendency to defer purchasing. In orders booked the showing in May has been for the most part better than in several months. From New England, on the other hand, it is reported that sales during the month were not satisfactory, and although a number of tools were sold the majority were second-hand. In Chicago the increasing number of inquiries from all sources, the large lists put out by the railroads and the prospect of heavy purchases by the automobile industry have put the trade in a better frame of mind.

Cleveland dealers report a fair number of orders for single machines and an increase of inquiry. The call is now largely for new machines, one of the explanations given being that the supply of good used machinery is no longer plentiful.

Among prospective buyers may be mentioned the American Vitrified Products Co., Akron, Ohio, which will require considerable heavy machinery for maintenance work to replace equipment recently ruined by fire. This will include lathes, milling machines, planers and other equipment. It is expected that a list will be sent out shortly.

It is expected that if the Pennsylvania Railroad goes ahead with its plan of building new shops at Pitcairn and Enola, considerable new equipment will be bought.

C. H. Wills & Co., Marysville, Mich., are planning to add considerable equipment, and are understood to have placed orders for several drilling machines. This company has also bought turret lathes and is figuring on eight or ten additional turret lathes.

The Studebaker Corporation, South Bend, Ind., placed an order recently with a local dealer in Chicago for $60,000 worth of multiple spindle drills, and other equipment. This company has appropriated $3,000,000 for additions and improvements and it is estimated that at least $1,000,000 will be spent for metal working equipment.

A reduction averaging 10 per cent was announced by the Hisey-Wolf Machine Co., Cincinnati, on its electric drills and grinders.

New York

NEW YORK, May 29.

Scattered railroad buying constitutes the chief activity of the machine-tool market the past week. The Western & Maryland Railroad has placed some orders against its recent list. It is expected that if the Pennsylvania Railroad goes ahead with its contemplated plan of building new shops at Pitcairn and Enola, Pa., considerable new equipment will be bought. Among railroad orders booked the past week are the following: East St. Louis, 400-ton wheel press; Wheeling & Lake Erie, 48-in. carwheel borer; Gulf & Ship Island Railroad, horizontal boring and drilling machine, crank slotter and 100-ton bushing press; Delaware & Hudson, 42-in. carwheel lathe; Cambria & Indiana, 79-in. driving-wheel lathe and 36-in planer. A few orders have also been placed by the Chilean State Railways.

The crane situation in this district remains unchanged. Few new inquiries have appeared the past week and current lists are still pending. In all probability the Narragansett Electric Light & Power Co., Providence, R. I., will close this week. The American Car & Foundry Co. will close shortly for electric hoists. The rebuilding of the plant of the Fischer-Sweeny Bronze Co., Hoboken, N. J., in charge of Lockwood, Greene & Co., 101 Park Avenue, New York, will involve a crane which will be purchased at a later date. The Erie Railroad, which has a list of machine tools out for its Hornell, N. Y., shops, will ask for prices on cranes later. The Asiatic Petroleum Co., 65 Broadway, New York, is about to close on a 2-ton, 53-ft. span, double I-beam hand-power crane.

Among recent sales are: Niles-Bement-Pond Co., a 15-ton, 97-ft. span, overhead traveling crane with 5-ton auxiliary, to the Western Maryland Railroad Co., Baltimore, Md.; Cleveland Crane & Engineering Co., a 2-ton tramrail and electric hoist, with about 1000 ft. of rail, to the Correy Iron Co., Portland, Me.; Industrial Works, a 12½-ton, 4-wheel locomotive crane with special boom to the Lorain Steel Co. for Johnstown, Pa., a 20-ton, 50-ft. boom locomotive crane for bucket handling to the Russell Condon Construction Co., Fowler, Ill.

The New York & Queens Electric Light & Power Co., Electric Building, Long Island City, will build a new one-story power house, 100 x 120 ft., at Maspeth, L. I. W. W. Knowles, Bridge Plaza, Long Island City, is architect.

The State Hospital Commission, L. M. Harrington, secretary, Albany, N. Y., will take bids until June 7 for a cold storage building and refrigeration work at the Utica State Hospital, Marcy Division, Marcy, N. Y. L. F. Pilcher, Capitol Building, Albany, is architect.

Plans have been completed for an extension to the manual training high school at the Flatbush Avenue Extension and Concord Street, Brooklyn, with improvements in the present building. D. B. J. Snyder, room 2800 Municipal Building, New York, is architect.

The R. Gowing Co., Sackets Harbor, N. Y., operating a boat-building plant, is planning for the installation of a number of machine tools.

The B. M. T. Garage, New York, recently organized, has leased the one-story building at 405-17 East Eleventh Street, for an automobile service and repair works.

In connection with the shop additions to be erected at its car and locomotive works, Hornell, N. Y., the Erie Railroad Co., 50 Church Street, New York, will build an erecting shop estimated to cost in excess of $200,000 with equipment, bringing up the total expenditure for the expansion to about $500,000.

The Firestone Tire & Rubber Co., 1871 Broadway, New York, is completing plans for a branch plant at Hamilton, Ont., estimated to cost in excess of $75,000. It will have an initial output of about 3500 tires a day.

The Phillips Petroleum Co., 115 Broadway, New York, is disposing of a bond issue of $600,000, a portion of the proceeds to be used for extensions and improvements.

Swinton & Co., 47 Jersey Avenue, Port Jervis, N. Y.,

manufacturers of stoves, stove castings, etc., will build a one-story foundry addition, 72 x 152 ft., to cost about $40,000. Robert Livingston, 2 Rector Street, New York, is architect and engineer. J. D. Swinton is in charge.

A one-story automobile service and repair works, 45 x 200 ft., will be erected by the Holland Laundry Co., 373 President Street, Brooklyn, on Twenty-fifth Street.

The New York Edison Co., 130 East Fifteenth Street, New York, will build a new reinforced-concrete power house at Fortieth Street and First Avenue, to cost about $250,000, including equipment.

The Town Council, Harrison, N. Y., will soon call for bids for a new electrically-operated pumping plant for the municipal water-works. Alexander Potter, 50 Church Street, New York, is engineer.

Joseph Silman, 26 Court Street, Brooklyn, will build a new one-story automobile service and repair works, 95 x 196 ft., at 251-63 Delancey Street, New York, to cost about $60,000. Missac Thompson, 191 Montague Street, Brooklyn, is engineer.

A vocational department will be installed in the two-story and basement junior high school to be erected at Portchester, N. Y., estimated to cost about $125,000. Karl C. Mertz, Portchester, is architect.

Property of the International Belt Co., Inc., 50 Smith Street, Newburgh, N. Y., manufacturer of mechanical belting will be sold by the receiver, Frederick W. Stelle, on June 6.

The United Hudson Electric & Railroad Co., Catskill, N. Y. will build a new power house to cost about $50,000.

The Singer Sewing Machine Co., 149 Broadway, New York, has plans in progress for a new lumber and finishing mill near Monroe, La., to include machine shop, power plant and other mechanical buildings, estimated to cost about $500,000 with machinery. Employment will be given to about 1000 and it is planned to commence work early in the fall.

The Lidgerwood Mfg. Co., 96 Liberty Street, New York, manufacturer of hoisting engines, logging machinery, etc., has perfected plans for the manufacture of its general line of equipment on the Pacific Coast, concluding a 50-year agreement with the Puget Sound Iron & Steel Works, Tacoma, Wash., to use its plant for this purpose. The latter company will also continue the production of its standard machinery.

Property of the New York Nipple Mfg. Co., 410 East Tenth Street, New York, including machinery, tools, etc., will be sold by the receiver C. C. Fries, on June 5.

Leonard Davis, 368 New York Avenue, Brooklyn, has plans under way for a new two-story automobile service building with machine shop, 66 x 150 ft. on Southern Boulevard, near 179th Street, estimated to cost about $55,000. John J. Dunnigan, 394 East 150th Street, is architect.

Shermaster & Latman, New York, operating a structural and ornamental iron works, have removed their plant from 203 East Ninety-eighth Street to 1099 Washington Avenue, Bronx, for enlargements.

The Falkenbach Mfg. Co., 159 East Fifty-fourth Street, New York, manufacturer of lighting fixtures, has acquired a three-story factory on Whitlock Avenue, 65 x 137 ft., for a new plant.

Herman Harjes, 408 East Seventy-sixth Street, New York, will take bids at once for a new two-story automobile service building and machine shop, 103 x 143 ft., to cost about $55,000. John E. Collins, 148 Montgomery Street, Brooklyn, is architect.

The Paterson & Passaic Gas & Electric Co., Paterson, N. J., has been granted permission to issue bonds for $50,000 for extensions and improvements, etc.

The National Boiler Co., South Avenue, Garwood, N. J., has awarded a contract to Levering & Garrigues, 552 West Twenty-third Street, New York, for three one-story foundry buildings. Hooper & Co., 116 Market Street, Newark, N. J., are architects.

The property of the Campbell Machine Works, Green Avenue, Lyndhurst, N. J., has been acquired by the People's Coal Co., recently organized, which will establish new works, with hoisting equipment, loading and unloading machinery, etc. William H. Wurdemann is head.

A vocational department will be installed in the new three-story high school, 80 x 150 ft., to be erected at Perth Amboy, N. J., estimated to cost about $200,000, for which bids will be asked early in July. George W. Brooks, 158 Madison Avenue, is architect.

A special election has been called at Pitman, N. J., to vote bonds for $225,000 for a new high school, to include a vocational department.

The National Lock Washer Co., 65 Johnson Street, Newark, N. J., has awarded a contract to Enstice Brothers, 40 Clinton Street, for a new two-story building, 40 x 100 ft. Monks & Johnson, 50 East Forty-second Street, New York, are architects and engineers.

The plant of the Klaxon Co., Newark, manufacturer of automobile horns, etc., at Wright and Emmett streets, comprising two three-story buildings and several one-story structures, has been purchased by the Federal Button Co., New Jersey Railroad Avenue and Market Street, manufacturer of machine-made composition buttons. The new owner will make improvements and build an addition to cost about $150,000 and remove its business to the new location. Edward J. Duggan is secretary and treasurer.

The Department of Streets and Public Improvements, City Hall, Newark, will soon call for bids for a two-story addition to its automobile service and repair works at Franklin Street and Vroon Alley, estimated to cost about $175,000, including equipment. Harry Briscoe, Firemen's Building, is architect.

W. A. Schuette, 132 Third Street, Union Hill, N. J., will soon take bids for a two-story automobile service building and machine shop, 50 x 105 ft., to cost close to $50,000. J. D. Lugosch, 21 Bergenline Avenue, is architect.

John W. Sullivan, 210 Willoughby Avenue, Brooklyn, has filed plans for the erection of a one-story addition to his machine shop at 827 East Ninth Street, New Extension. O. T. Kveuvik, 177 Harrison Place, West Brighton, S. I., is architect.

The V & O Press Co., Brooklyn, N. Y., has just purchased additional machine shop equipment and is planning the erection of a factory on a 7½ acre tract of land which it owns on Cooper Avenue and the Long Island Railroad, Glendale. The increasing demand for V & O power presses and sheet metal working machinery has necessitated this expansion, as the present factory on Dry Harbor Road has become inadequate.

New England

BOSTON, May 29.

Sales of machine tools in this district the past week were again limited to single machines, most of them used. A 3500-lb. inclinable used press, taken by a Cambridge, Mass., automobile accessory manufacturer, represented the largest piece of equipment that changed hands. Due to the lack of business most of the machine tool houses closed from Saturday, May 27, to Wednesday, May 31. May will be recorded in the local machine tool trade as most unsatisfactory. While a number of machines were sold, a large majority were second-hand and were bought at prices that left only a small margin of profit for the dealer. One railroad and leading manufacturing interests still have lists of equipment under consideration, and a large number of individual machines are also being considered by a wide variety of users. The trade therefore anticipates a much better showing in June.

The city of Providence has purchased a No. 4, type G Brown hoist from the Brown Hoisting Machinery Co., Cleveland, for $11,635, for use on the city dock.

The board of directors, Wentworth Institute, Boston, has appropriated $25,000 for new equipment and to complete plans for alterations in the chemical and electrical laboratories.

The Simplex Wire & Cable Co., Cambridge, Mass., has awarded a contract for a four-story addition, 90 x 100 ft., to Stone & Webster, Inc., Boston.

The Remington Cutlery Works, Bridgeport, Conn., has been organized with a capital stock of $25,000 by the Remington Arms Co., of that city, as a subsidiary. The products will be manufactured in the Bridgeport plants of the company.

The Foster Machine Co., Westfield, Mass., has let contract for the erection of several additions, the largest of which will be a one-story and basement manufacturing unit, 80 x 120 ft.

The Hampden Grinding Wheel Co., Springfield, has incorporated under Massachusetts laws, with a capital of $100,000, to take over the Hampden Corundum Wheel Co. Willard P. Leshure, president of the former company heads the new, the other incorporators being Frank S. Hatch, Longmeadow, and John M. Collins, West Springfield.

The American Printing Co., Fall River, Mass., is planning to rebuild its machine shop at Mill No. 6, recently destroyed by fire.

A vocational department will be installed in the new high school to be erected at Fairfield, Conn., estimated to cost about $350,000. C. O. S. Ziroli, 211 State Street, Bridgeport, Conn., is architect.

The Presbey-Leeland Co., Barre, Vt., is considering the

erection of a new marble works at Brattleboro, Vt., estimated to cost approximately $100,000, including machinery.

Fire, May 24, destroyed a portion of the plant of the National Folding Box Co., New Haven, Conn., with loss estimated at $100,000, including machinery.

The Hoggson & Pettis Mfg. Co., New Haven, Conn., manufacturer of chucks, etc., has acquired the entire six-story building, heretofore occupied in part, for extensions in a number of departments. New equipment will be installed.

A vocational department will be installed in the new junior high school to be erected at Medford, Mass., estimated to cost about $300,000. Plans are being prepared by the Joseph D. Leland Co., 41 Mount Vernon Street, Boston.

The S. O. & C. Co., Ansonia, Conn., manufacturer of metal eyelets and other specialties, has awarded contract to the H. Wales Lines Co., Meriden, Conn., for a second story to a present building, 26 x 196 ft.

The Lowell Bobbin Co., Lowell, Vt., manufacturer of bobbins and other textile machinery equipment, is planning to rebuild the portion of its factory destroyed by fire, May 22.

A vocational department will be installed in the new high school to be erected on Sawyer Road, Beverly, Mass., estimated to cost about $750,000. Adden & Parker, 177 State Street, Boston, are architects.

The Merrimack Clay Products Co., Boston, recently organized with a capital of $400,000, has leased property at Plaistow, Mass., for a new plant to manufacture hollow tile products. The initial works will cover about 3 acres and will have a capacity in excess of 40,000 tons of material a year. It is estimated to cost in excess of $125,000, including machinery. M. Kimball Wentworth is president, and M. A. McGrath, 38 Newbury Street, Newton Centre, Mass., treasurer. W. G. Demarest, head of the Raritan Hollow Tile Corporation, Keasbey, N. J., is interested in the new company.

The City Council, West Hartford, Conn., will build a new power house at the filtration plant.

The Rockingham County Light & Power Co., Portsmouth, N. H., is disposing of a bond issue of $650,000, a portion of the proceeds to be used for extensions and improvements.

Philadelphia

PHILADELPHIA, May 29.

The Philadelphia Tram Rail Co., Front and Tusculum streets, Philadelphia, manufacturer of railroad frogs, switches, etc., has completed plans for a new one-story factory, 60 x 90 ft.

The Bureau of Supplies and Accounts, Navy Department, Washington, will receive bids until June 13, under schedule 9672, for a.c. electrical generators, in lots of 15, 30, and 50, for use at Philadelphia and at Anacostia, D. C. Also, until June 6, for the Philadelphia navy yard, a quantity of miscellaneous ferrules, shackles and turnbuckles, as set forth in schedule 9663.

The Pennsylvania Railroad Co., Eighteenth and Filbert streets, Philadelphia, is planning to purchase a number of small machine tools.

The Fidelity Machine & Mfg. Co., 4015 Paul Street, Philadelphia, manufacturer of machinery, parts, etc., has awarded contract to A. W. Shirreff, 608 Chestnut Street, for a new plant at Frankford and Pike streets, to cost approximately $69,000.

The W. J. McCahan Sugar Refining Co., Front and Chestnut streets, Philadelphia, will build a one-story power house at its plant to cost about $42,000.

The Berger Brothers Co., 229 Arch Street, Philadelphia, manufacturer of roofing products and other metal specialties, will commence the immediate construction of a five-story and basement building, 38 x 70 ft., at 235 Arch Street. William H. Berger is president.

Otto U. Hofmann, 2015 Leithgow Street, Philadelphia, operating a general machine works, has awarded a contract to Otto Maltz & Son, 2002 North Fourth Street, for a new one-story machine shop at Third and Cayuga streets, to cost about $17,000.

C. B. Leonard, 2429 West Allegheny Avenue, Philadelphia, general machinist, is planning to purchase a number of machine tools.

The H.S.B.W.-Cochrane Corporation Co., Seventeenth and Clearfield streets, Philadelphia, manufacturer of water heaters and other power plant equipment, has filed plans for a one-story addition.

Alfred Box & Co., Inc., 813 North Front Street, Philadelphia, manufacturer of cranes, hoisting machinery, etc., will build a new machine shop, pattern shop and pattern storage building. Clarence E. Wunder, 1415 Locust Street, is architect.

The Philadelphia Suburban Gas & Electric Co., West Washington Square, Philadelphia, is disposing of a bond issue of $700,000, the proceeds to be used for extensions and improvements, general operations, etc. M. W. Stroud is president.

The Jes Campbell Motor Co., 1425 North Watts Street, Philadelphia, motorcycles, has leased property at 3334 North Broad Street, for a new works.

The Kieckhefer Paper Co., Camden, N. J., manufacturer of paper and fiber shipping containers, a subsidiary of the Kieckhefer Box Co., Milwaukee, Wis., will build a new plant at Delair, N. J., estimated to cost in excess of $75,000, with machinery. J. W. Kieckhefer is president.

A one-story electrically-operated pumping plant will be constructed by Blumenthal Brothers, Margaret and James streets, Philadelphia, in connection with a new three-story addition.

Officials of the Crescent Insulated Wire & Cable Co., Olden and Taylor streets, Trenton, N. J., have organized the Crescent Armored Wire Co., with capital of $500,000, to manufacture insulated wire products. C. Edward Murray, Sr. and Jr., and J. Cornell Murray head the organization.

The Worthington Pump & Machinery Corporation, 115 Broadway, New York, has acquired all manufacturing rights for the centrifugal pumps and pumping engines heretofore produced by the Camden Iron Works, Camden, N. J., and will make immediate arrangements for production under the acquired patents at its plants.

The Trent Tile Co., Inc., Klagg Avenue, Trenton, N. J., will build a new one-story power house at its plant, 30 x 50 ft. The Fowler-Seaman Co., Broad Street Bank Building, is architect.

The John Peters Packing Co., 1320 East Third Street, Williamsport, Pa., will build a four-story addition to its cold storage and refrigerating plant, 68 x 70 ft. C. B. Comstock, 110 West Fortieth Street, New York, is engineer.

Controlling devices, electrical and other mechanical equipment, motors, etc., will be installed in the one-story printing plant, 135 x 800 ft., to be erected at Pembroke, Bethlehem, Pa., by the Carey Printing Co., Tenth Avenue and Thirty-sixth Street, New York, estimated to cost about $250,000. Other units will be constructed later to bring the total investment in excess of $1,000,000.

The Township School District, Plains, Pa., will have revised plans prepared for the erection of a two-story and basement high school, 120 x 120 ft., to include vocational department, estimated to cost about $100,000, Austin L. Reilly, Bennett Building, Wilkes-Barre, Pa., is architect.

The Vulcweld Rubber Co., Pottstown, Pa., manufacturer of automobile tires, has acquired property, 300 x 400 ft., at Limerick, near Pottstown, as a site for new works. It is planned to have the factory ready for service in the fall.

The Du Roth Steel Truck Co., Greenville, Pa., will take bids at once for its proposed motor truck manufacturing plant on Osgood Street, to cost about $55,000.

The Eastern Pennsylvania Light, Heat & Power Co., Pottsville, Pa., has acquired property at Pinegrove, as a site for a new electric generating plant to cost in excess of $2,000,000 with machinery.

The Auto Radiator Service Co., Cameron and Mulberry streets, Harrisburg, manufacturer of automobile radiators and sheet metal products, has perfected plans for a branch plant at Lewistown. It will be in charge of J. S. Sherman, one of the proprietors of the company.

The J. S. Wentz Co., Land Title Building, Philadelphia, has tentative plans under way for the eleectrification of its coal plant and colliery at Girardville, Pa., to include electric power house for service.

The Woodbury Township, North Woodbury Township, Taylor Township and Bloomfield Township Power companies are being organized by Philadelphia interests, represented by James Collins Jones, Bullitt Building, to construct and operate electric light and power plants. Preliminary plans are under way.

Chicago

CHICAGO, MAY 29.

As a whole—machine tool buying is still moderate, but the tendency is toward further improvement. The increasing number of inquiries, the large lists put out by railroads, and the prospect of heavy purchases by the automobile industry have put the trade in a happier frame of mind, although it is notable that comparatively little of this business has yet been placed. The principal exception is a recent order for $60,000 worth of multiple-spindle drills and other special purpose equipment placed by the Studebaker Corporation, South Bend, Ind., with a local dealer. This company has appropriated $3,000,000 for additions and betterments to its South

Bend plant, and it is estimated that at least $1,000,000 will be spent for metal working equipment. The Standard Oil Co., Whiting, Ind., is inquiring for a set of mending rolls for 40-ft. 1¼-in. plate. The Illinois Central has issued further inquiries bringing the total number of machines on its list up to 104. Of this number 58 were published in these columns last week. The remaining 46 follow:

One 2-in. double head bolt threading machine.
One 1½-in. triple head bolt threading machine.
One 1-in. rapid bolt heading and forging machine.
One combination punch and shear with capacity to punch and shear plates up to 3/16-in.
Three 36-in. to 40-in. heavy duty upright drill presses.
One 72-in. heavy duty radial drill.
One universal reamer and cutter grinder.
Seven 18-in. x 3-in. x 1½-in. double floor grinders with two grinding wheels.
Eight 36-in. special railroad draw-cut shapers.
Five 54-in. vertical turret lathes.
Four 42-in. vertical turret lathes.
Two 96-in. 600-ton driving wheel presses.
One 15-in. turret brass lathe.
One 24-in. to 28-in. heavy duty turret lathe with 7-in. hole through spindle.
One 2½-in. x 24-in. turret lathe.
Three 3-in. x 36-in. turret lathes.
One 14-in. x 6-ft. portable engine bolt lathe.
One No. 3 horizontal knee type heavy duty milling machine.
One No. 3 vertical milling machine.
One heavy duty vertical type milling machine suitable for machining locomotive rods, rod straps and similar parts.
One 18-in. engine lathe.

The Hisey-Wolf Machine Co., Cincinnati, has announced reductions on electric drilling and grinding machines averaging 10 per cent.

The Ray-Di-Co Organization, Inc., 1547 North Wells Street, Chicago, recently incorporated with $100,000 capital stock, has been in business as a partnership for two years. Up to the present it has conducted a retail and jobbing business in radio and electrical equipment, but it contemplates the production of a complete line of radio apparatus and accessories by early fall. To this end it is looking for a small shop properly equipped so that manufacture can be started as quickly as possible. It has already opened up a new branch at 1215-17 Leland Avenue, consisting of salesroom, broadcasting room, demonstration booths, laboratory and an auditorium seating several hundred people.

The Hanson Brothers Scale Co., 523-531 North Ada Street, Chicago, has been incorporated to take over the business of Hanson Brothers at the same address. The incorporation followed the death on March 25 of William J. Hanson, by which the partnership with M. H. Hanson was dissolved. The company is not in the market for additional equipment. New officers are Marius H. Hanson, president; Mrs. Anna F. Hanson, vice-president, and S. L. Hanson, secretary and treasurer.

The Western Foundry Co., 3634 South Kedzie Avenue, Chicago, will build an additional one-story unit, 76 x 138 ft., at 3654 South Kedzie Avenue, to cost $12,000.

The Atwell Printing & Binding Co., 732 Sherman Court, Chicago, has let a contract for an eight-story plant, 120 x 177 ft., at 2000-16 Prairie Avenue, to cost $450,000.

The Kansas Electric Power Co. plans to erect a central power plant at Leavenworth, Kan., to cost $1,500,000.

The Fisher Machine Works, Leavenworth, Kan., has been re-incorporated as the Fisher Machine Works Corporation, with $200,000 capital stock. It is extending its shops to double the capacity.

The Munising Foundry Co., Munising, Mich., has bought a site at Hibbing, Minn., for the construction of a foundry.

L. A. Cohen & Brother, 1100 Fulton Street, Chicago, have purchased the former plant of the LaSalle Steel Co. at 5429-39 Roosevelt Road, and will install equipment for smelting and refining nonferrous metals. Among the products which will be made will be brass and bronze ingots, Babbitt, solder, ingot copper, spelter and printers' metals.

The Gartland Foundry, which recently located in part of the old Chicago & Eastern Illinois shops at Danville, Ill., expects to be ready to start operation about Sept. 1. Improvements on the building and the installation of new equipment involve a cost of about $100,000.

The International Radio & Ignition Corporation, 225 North Michigan Avenue, Chicago, recently incorporated with $100,000 capital stock, will not erect a plant but has let contracts for the manufacture of radio sets and parts and automobile ignition systems to its own specifications. B. C. Lindley is president and general manager.

George Crider is building a garage and machine shop, 60 x 90 ft., on East Main Street, Greenfield, Ind.

The Illinois Pure Aluminum Co., Lemont, Ill., has awarded contract to E. W. Sproul, Pershing Road and Robey Street, Chicago, for a one-story addition, estimated to cost about $35,000. F. D. Chase, Inc., 645 North Michigan Avenue, Chicago, is engineer.

The Water & Light Commission, Virginia, Minn., will commence the immediate erection of an addition to the municipal power plant. A. T. Harding is engineer.

The Universal Motor Co., 2558 Leavenworth Street, Omaha, Neb., will build a new two-story service building, 110 x 132 ft., with machine shop, estimated to cost $60,000.

The State Board of Examiners, Helena, Mont., will commence the immediate erection of a new two-story central power house at the University of Montana, Missoula, to cost about $110,000. The C. L. Pillsbury Co., 1200 Second Avenue, South, Minneapolis, Minn., is engineer.

Fire, May 19, destroyed a portion of the plant of the American Brake Shoe & Foundry Co., University and Thirty-seventh avenues, N. E., Minneapolis, Minn., with loss estimated at about $30,000. It is planned to rebuild.

The Cooper Mill & Light Co., Humboldt, Neb., is planning to rebuild its electric power plant, recently partially destroyed by fire with loss estimated at about $50,000.

A vocational department will be installed in the new two-story and basement high school to be erected at Nelson, Neb., estimated to cost about $70,000. H. D. Pampel, 402 Finance Building, Kansas City, Mo., is architect.

The Lake Superior District Power Co., operated by the Middle West Utilities Co., 72 West Adams Street, Chicago, is disposing of a bond issue of $1,345,000, a portion of the proceeds to be used for extensions and improvements, including the completion of a hydro-electric power plant at Big Falls, Wis. L. E. Myers is president.

The Chicago, Burlington & Quincy Railroad, 547 West Jackson Boulevard, Chicago, will take bids early in June for a new engine house, with shops, at Council Bluffs, Iowa. W. T. Kraush, company address, is architect.

The Atchison, Topeka & Sante Fe Railroad, 80 East Jackson Boulevard, Chicago, will commence clearing the site at Albuquerque, N. M., for the erection of a new boiler and tank manufacturing plant, to cost in excess of $400,000, including equipment. A. G. Wells is vice-president.

The Auto Parts Replacement Co. and the Fentress Piston Ring Co., Chicago, have leased the four-story building, 20 x 100 ft., at 1919 South Michigan Avenue, for new plants.

The Mississippi Valley Power Co., operated by H. M. Byllesby & Co., 208 South La Salle Street, Chicago, engineers, is disposing of a bond issue of $400,000, the proceeds to be used for extensions and improvements.

Cleveland

CLEVELAND, May 29.

Automobile manufacturers are buying considerable machinery and there is an increased demand from the railroads. C. H. Wills & Co., Marysville, Mich., are planning to add equipment and are understood to have placed orders for several drilling machines. They have also bought two turret lathes and are figuring on eight or 10 additional. The Studebaker corporation purchased several drilling machines for its Detroit plant and has a list out for a number of drilling machines for its South Bend plant. The Willys Overland Co., Toledo, during the week purchased four manufacturing lathes. It is reported that some jobbing machine shops which cater to the automobile trade have advanced prices for their work and as a result some automobile plants are arranging to install equipment for work which has been done outside under contract.

While no railroad lists have come out in this district, local machine tool manufacturers are quoting on small lots of machines on lists that have appeared in other sections. A new list has been issued by The Florida & West Coast Railroad, which among other items contains a number of drilling machines. The Western Maryland Railroad has purchased two drilling machines from a Cleveland manufacturer.

Local dealers report a fair number of orders for single machines and an increase in the volume of inquiry. There is some demand from garages for grinding machines. One dealer the past week sold four medium size presses.

A development of the market situation is that the call is now largely for new machines. The explanation for this change is that the supply of good used machinery is no longer plentiful and buyers are less inclined to conserve their resources by the purchase of used instead of new machinery.

The American Vitrified Products Co., Akron, Ohio, will require considerable heavy machinery for maintenance work to replace equipment recently ruined by fire, including lathes, milling machines, planes, drilling machines, shapers and perhaps other equipment. A list is expected to be sent out shortly.

The Gardner Tap & Die Co., Cleveland, has been incor-

porated to refinance and take over the business of the Gardner-Bryan Co., Cleveland, manufacturer of taps, dies and screw plates. F. W. Wood, president Wood & Spencer Co. and Cleveland Castings Pattern Co., is the new president; J. M. Gardner is vice-president, sales manager and treasurer; D. G. Miller, secretary Wood & Spencer Co., is secretary. A. K. Spencer, vice-president Wood & Spencer Co.; F. H. Wood and F. E. Gardner are members of the board of directors.

The Ferro Machine & Foundry Co., Cleveland, will enlarge its plant by the erection of a building, 60 x 160 ft., to be used for machine shop, cleaning and warehouse purposes. Contract has been placed with the H. K. Ferguson Co., Cleveland.

The Logan Foundry & Machine Co., Logan, Ohio, will enlarge its plant by the erection of two buildings, 66 x 100 ft. and 60 x 90 ft., respectively.

The Firestone Tire & Rubber Co., Akron, Ohio, will start work shortly on its proposed plant at Hamilton, Ont.

It is reported that an extension, 95 x 100 ft., will be built to the Banner electric plant of the General Electric Co., at Youngstown, Ohio.

The Gartland-Carroll Foundry Co., Sandusky, Ohio, is again operating its plant which has been shut down since November, 1920.

The Power Investment Co., 929 Williamson Building, Cleveland, has leased the former power house of the Cleveland Railway Co. at Cedar Avenue and Ashland Road and plans to remodel the building and erect an addition at an estimated cost of $350,000. Charles F. Cox is president.

The National Bronze & Aluminum Foundry Co., Cleveland is building a 150-ft. addition to its new plant at East eighty-eighth Street and Laisy Avenue and is in the market for molding machines and miscellaneous foundry equipment.

The Standard Welding Co., the rim and tube division of The Standard Parts Co., reports 36 new customers on its books and an expected increase in shipment for May of 100 per cent over March. The increase in business is not entirely automotive, although there is a strengthening demand for the company's exhaust and windshield tubing and rims. One order for several million feet of tubing comes from the general industrial field. The Eaton Axle Co., axle division of standard parts, has just received some very substantial orders from the Cadillac Motor Co.. The Perfection Spring Co., another division of Standard Parts, reports that its tonnage shipments for May will be the highest of any like period in the last 18 months.

Cincinnati

CINCINNATI, May 29.

The machinery market continues to show improvement and while this is not felt by all manufacturers, nevertheless the general situation is better than it has been for many months. Orders booked by a local manufacturer the first three weeks of May are the heaviest for any month since November, 1920. Buying is not confined to any one industry, railroads, automobile manufacturers and various other lines contributing to the total. During the week the Ford Motor Co. placed an order with a local manufacturer for four 36-in. engine lathes and the Western Maryland Railroad purchased three tools on its list recently issued. The Wheeling Corrugating Co. also took a number of machines and a local manufacturer reports the receipt of a fair sized order for export to Japan. Pending business includes several machines for the Portsmouth plant of the Wheeling Steel Corporation and 12 14-in. engine lathes for the Navy Department, which are expected to close this week. There is also a fair demand for sensitive drills and screw machines, coming principally from manufacturers of radio equipment.

The Formica Insulation Co., Cincinnati, manufacturer of composition gears and insulation, has increased its capitalization from $100,000 to $150,000. The additional capital will be devoted to enlarging its plant to take care of its rapidly expanding business.

Pittsburgh

PITTSBURGH, May 29.

Inquiries for machinery and equipment still are fairly numerous, but in the past week or so there has again developed a tendency on the part of prospective buyers to defer purchases. In a number of cases purchases of cranes have been put off because operating officials, having made requisitions for some other much needed installation, have been disinclined to put in requests for other appropriations at this time. The reduction in freight rates, effective July 1, also is advanced as a restrictive influence on current purchases. The quieter market here as far as sales are concerned probably is due to conservatism about the future. General business has shown several upturns since last fall and though it now seems to be permanently upward, buyers want to be completely convinced before making investments in equipment. The General Electric Co. will furnish the drives for a plate mill for the Youngstown Sheet & Tube Co., Youngstown, the mill to be built by the Mackintosh-Hemphill Co., Pittsburgh.

The Jones & Laughlin Steel Co., Ross Street and Third Avenue, Pittsburgh, has plans under way for a one-story addition, 200 x 200 ft., to replace the building recently destroyed by fire.

The Seyler Mfg. Co., Sharpsburg, Pittsburgh, recently organized, has arranged for the operation of a local plant, totaling about 65,000 sq. ft. of space, to manufacture hardware products for electric transmission line service, brackets, mast irons, etc. Carl Seyler, formerly vice-president and general manager of the Hubbard Co., Pittsburgh, manufacturer of kindred equipment, heads the company.

The Keystone Power Corporation, Ridgway, Pa., has arranged for a bond issue of $1,750,000 and preferred stock issue of $1,150,000, the proceeds to be used for the acquisition of the Keystone Electric Service Co., and the construction of a new hydroelectric power plant at Keating, Pa.

The Board of Directors, Western Penitentiary of Pennsylvania, Pittsburgh, has plans under way for a one-story machine shop, 30 x 130 ft. John Francis, warden, is in charge.

J. D. McIlroy & Sons, 508 Second Avenue, Pittsburgh, manufacturers of sheet metal products, have filed plans for a new one-story factory at 800 Second Avenue, to cost about $25,000.

The Bessemer Gas Engine Co., Grove City, Pa., is planning for the erection of an addition to cost about $25,000.

Guy Woodward, Charleroi, Pa., has construction under way on a three-story addition to his automobile service and repair works, 88 x 100 ft., estimated to cost $42,000.

The National-Pittsburgh Automobile Co., 5865 Baum Boulevard, Pittsburgh, has acquired property, 87 x 128 ft., at Baum Boulevard and Fairmont Avenue, and has tentative plans under way for a new sales, service and repair building to cost about $80,000.

The Pennsylvania-Ohio Electric Co., New Castle, Pa., has arranged for a bond issue of $1,950,000, a portion of the proceeds to be used for extensions and improvements.

A. B. Knight, 117 East Park Avenue, Fairmont, W. Va., has plans under way for a new factory, 75 x 90 ft., to manufacture glass-making machinery and parts. A general repair works will also be established. The plant will replace one recently burned.

Fire, May 20, caused by an explosion, destroyed a portion of the power plant at the property of the Peck's Run Coal Co., Buckhannon, W. Va., with loss estimated at about $25,000. It is planned to rebuild.

A three-story and basement automobile service building, 60 x 125 ft., with machine shop, will be erected by the Warren Automobile Trading Co., Wheeling, W. Va., to cost about $55,000. Frank Warren is general manager.

The Wheeling Oxygen Co., Wheeling, W. Va., manufacturer of commercial oxygen, is planning the erection of new works at Warwood, W. Va.

The Island Creek Coal Co., Holden, W. Va., is planning to rebuild its machine shop, recently destroyed by fire with loss of about $75,000, including equipment.

The Hopkins Motor Co., Wheeling, W. Va., has plans under way for a three-story and basement service and repair building on Fifteenth Street, 40 x 60 ft., to cost about $50,000. E. B. Hopkins is head.

The Charleston Paper Mfg. Co., Charleston, W. Va., will expend about $200,000 for machinery for its new plant on property recently acquired at Nitro, W. Va., totaling about 8 acres. Existing buildings will be remodeled and new mills erected. The entire investment will approximate $400,000. Charles G. Hartje is president.

A vocational department will be installed in the new high school to be erected at Martinsburg, W. Va., for which bids will be received until June 9. It is estimated to cost about $200,000.

A vocational department will be installed in the high school to be erected by the Board of Education of the Magnolia District, New Martinsville, W. Va. F. F. Farris, Wheeling Steel Corporation Building, Wheeling, W. Va., is architect. S. Bruce Hall is president of the board.

Milwaukee

MILWAUKEE, May 29

The development of machine tool activities in May have been satisfactory. While volume is still very small, sales generally are reported to have been heavier than any month in the last 18. In addition, inquiry the past two to three weeks indicates that business in June will be even better.

The revival of demand from railroads appears to be setting in which will provide real substance to the trade, which up to this time has depended largely upon the automotive industries for bulk. Foundry activities continue to increase. A large local interest specializing in sanitary ware is doubling the capacity of its casting shop. The Belle City Malleable Iron Co., Racine, has made public plans for new construction and equipment involving more than $500,000. The West Milwaukee car and locomotive shops of the Chicago, Milwaukee & St. Paul Railway Co. are adding 500 men for new freight car construction, making the force 3000. Every day reports tending to show general expansion of the metal-working industries are coming forth.

The Wisconsin Electric Power Co., subsidiary of the Wisconsin Public Service Co., Green Bay, Wis., and Milwaukee, has let contract to the Westinghouse Electric & Mfg. Co., Pittsburgh, for furnishing and installing the entire equipment of a $500,000 hydroelectric generating plant at Ellis Junction, Wis. Contracts for the plant construction and dam will be let May 31. The project is in charge of Mead & Seastone, consulting engineers, Madison, Wis.

The Belle City Malleable Iron Co., Racine, Wis., has plans for the construction and equipment of additions and improvements costing upward of $500,000 and has applied to the Common Council for the vacation of Kewaunee Street, from Fortieth Street to the Chicago & Northwestern Railroad Co. tracks. Definite details are not disclosed, however.

The Kneeland-McLurg Lumber Co., Phillips, Wis., sustained an estimated loss of $165,000 by fire which on May 19 destroyed its main sawmill, one of the largest electrically-operated plants of this character in Wisconsin. Reconstruction will be started as soon as insurance adjustment has been completed. Practically a new complement of machinery and equipment will be required. Pierson Kneeland is president.

The Milwaukee Advertising & Novelty Co., Milwaukee, has been organized to manufacture electric cigar-lighters and similar advertising appliances and novelties. A plant is being equipped at 125-127 Reservoir Avenue. The principal items have been contracted for. It is capitalized at $250,000. Leo G. Smith is president, general manager and treasurer. Waldemar C. Wehe, attorney, is secretary. Offices are in the Majestic Building, 221 Grand Avenue.

The Board of Education, Sparta, Wis., is taking bids until June 5 for a new school, estimated to cost $250,000, and to contain vocational training department. The architects are Parkinson & Dockendorff, La Crosse, Wis. Dr. S. D. Beebe, is chairman of the board.

The Rundle Mfg. Co., Milwaukee, manufacturer of bathtubs and other sanitary ware, has started work on a foundry addition, 60 x 210 ft., of brick and steel. The general contractor is Otto C. Randolph, 209 South La Salle Street, Chicago. The project is under the direction of Charles C. Kerwin, Chicago, architect. Henry Held is secretary-treasurer of the Rundle company.

The Wells Mfg. Co., Fond du Lac, Wis., is purchasing miscellaneous equipment for a new department to manufacture radio apparatus and parts. The output of ignition coils, generators and other electrical devices and supplies for the automotive and other industries is also being increased. E. R. Silverthrone is vice-president and general manager.

The Board of Education, Superior, Wis., will call for bids after June 1 for the new East End high school, estimated to cost $250,000, and to contain manual training shops. H. E. Johnson, Superior, is the architect in charge.

The Jackson Monument Co., 530 East Grand Avenue, Beloit, Wis., will build an extension, 44 x 110 ft., two stories, and will install additional grinding and polishing machinery and other equipment.

Julius Hansen, Oshkosh, Wis., who has acquired the business of the defunct International Cultivator Corporation at Oshkosh, will resume operation of the plant, which manufactured gas engines and motors for power farm operating equipment. The purchase does not include the buildings and real estate, which, however, have been leased by Mr. Hansen.

The Bullard Mfg. Co., Madison, Wis., was incorporated in January of this year, and owing to its increasing business has moved into the plant of the Madison Tool & Stamping Works, 1970-1984 Helena Street, where ample facilities are provided for larger production. Earl J. Bullard, a specialist in machine tools, is president and general manager, and Walter L. Jersey, formerly with the Gisholt Machine Co., is secretary and treasurer.

Baltimore

BALTIMORE, May 29.

The Maryland Steel Products Co., Baltimore, is considering the erection of a new one-story steel fabricating plant at Bayard and Redgely streets. A. G. Harkins is head.

Several heavy duty cranes and other equipment will be installed in the new shops to be erected by the Western Maryland Railroad Co., Baltimore, at Port Covington, Md., with main building 100 x 300 ft., and several smaller structures. A portion of the machinery will be removed from the existing shops at Hagerstown, Md., which will be discontinued, and other equipment purchased. Maxwell C. Byers is president.

Holstein Harvey, Inc., Third and French streets, and the J. D. Sisler Co., Third and King streets, Wilmington, Del., wholesale grocers, are organizing a new company to be known as the Harvey & Sisler Warehouse Co., capitalized at $200,000, to build a four-story, reinforced-concrete refrigerating and cold storage plant, 120 x 180 ft., estimated to cost in excess of $100,000. Provision will be made for the erection of three additional stories later.

The Wilmington Sugar Refining Co., Christiana Avenue and B Street, Wilmington, Del., will build a one-story power plant, 93 x 150 ft., and 90 x 90 ft. W. J. Wayte, Inc., 125 East Foryt-sixth Street, New York, are engineers.

The Common Council, Clifton Forge, Va., will receive bids until June 10, for the construction of a municipal electric power plant.

The Utility Mfg. Co., Goldsboro, N. C., has preliminary plans under way for the rebuilding of its veneer plant, recently destroyed by fire with loss estimated at about $200,000, including machinery. J. L. Borden is president.

The Bureau of Supplies and Accounts, Navy Department, Washington, will receive bids until June 13 for 16 motor-driven boiler feed pumps, with spare parts and wrenches, schedule 9661; and for 9 motor-driven fuel-oil pumps, with motor and control panel, and spare parts, schedule 9665, also for 20 centrifugal separators, electrical and mechanical spare parts, including motors and control panels, schedule 9667.

Fire, May 21, destroyed a portion of the plant of the Atlantic Paper & Pulp Co., Fort Wentworth, Ga., with loss estimated at about $50,000, including equipment.

Felix Hayman, North Tryon Street, Charlotte, N. C., is organizing a company to establish a storage and refrigerating plant, estimated to cost about $55,000. A local building has been acquired and will be remodeled.

The office of the Commissioners of the District of Columbia, Washington, will take bids until June 5, for a power plant at the Gallinger Hospital, Nineteenth Street and Massachusetts Avenue, S. E., including all mechanical equipment and radial brick stack. Full information at room 427, District Building. Cuno H. Rudolph, James F. Oyster and Charles Keller are city commissioners.

The Quenahoning Coal Co., Frostburg, Md., is considering plans for rebuilding its tipple, destroyed by fire, May 19, with loss approximating $25,000.

The City Gas Co., Norfolk, Va., will build a new power house to cost close to $40,000. T. Norman Jones is general manager.

Bids for steel springs and 2500 lb. of wire fence staples will be received by the Norfolk & Western Railway Co., Roanoke, Va., until June 7. J. H. Clemmitt is purchasing agent.

The Ideal Ice & Fuel Co., Shelby, N. C., recently organized, will commence the erection of a new ice-manufacturing and refrigerating plant. A. P. Weathers is president, and C. A. Turner, secretary and treasurer.

The Baltimore & Ohio Railroad Co., Baltimore, has preliminary plans in progress for the electrification of a portion of its Cumberland Division from Piedmont to Terra Alta, and from Terra Alta to Tunnelton, estimated to cost close to $5,000,000, including equipment. The project will include the construction of two hydroelectric generating plants on the North Branch of the Potomac River, near Bloomington, Md., and on the Cheat River, near Rowlesburg, W. Va., respectively.

The Southern Construction & Supply Co., Atlanta, Ga., will build a new mechanical assembling shop, to occupy a portion of a two-story building 110 x 114 ft., estimated to cost about $25,000.

The Ware County Light & Power Co., Waycross, Ga., will increase the capacity of its power plant with the installation of new generating equipment and auxiliary machinery.

The Lowenberg-Goodman Corporation, 127 Granby Street, Norfolk, Va., has received a low bid of $194,000 for its two-story automobile service building, 90 x 305 ft., with machine shop, and will soon award contract.

A vocational department will be installed in the new high school to be erected at Raleigh, N. C., estimated to cost about $350,000. The Raleigh Township School Committee is in charge. F. Simpson, 110 East Lane Street, is architect.

The Central South

ST. LOUIS, May 29.

The Jefferson City Light, Heat & Power Co., Jefferson City, Mo., will take bids at once for extensions in its power plant to cost close to $50,000.

The Annapolis Lead Co., 1217 International Life Building, St. Louis will commence the immediate erection of a new plant at Annapolis, Mo., comprising a main concentrator building, 80 x 180 ft., crushing plant, 40 x 85 ft., and power house, 60 x 80 ft. The installation will include crushing machinery, metal milling equipment, turbines, stokers, etc. M. C. Rhodes is president.

The Rubber Mfg. Co., Kansas City, Kan., has acquired the local plant of the Rubber Products Co. Plans are being prepared to increase the capacity to about 1000 automobile tires and tubes per day. New machinery will be installed.

Fuller & McClintock, Produce Exchange Building, Kansas City, are arranging to purchase power and other equipment for a local plant, including pumping machinery, boilers, stokers, coal-handling equipment, and traveling cranes. J. R. McClintock is in charge.

The Utah Ice & Cold Storage Co., care of Walter Boschen, Totle Lacy Building, architect, has plans under way for a new cold storage and refrigerating plant in the vicinity of Ogden, Utah, to cost about $200,000, including machinery.

The Hermitage Portland Cement Co., Chattanooga, Tenn., will take bids until early in July, for equipment for its new cement plant on a portion of the former Government property at Old Hickory, Nashville, Tenn., recently acquired. The buildings and machinery will cost close to $1,000,000. R. T. Miller, 174 Third Avenue, North, Nashville, secretary, is in charge.

The Sunflower Oil & Supply Co., Topeka, Kan., is planning to rebuild its factory destroyed by fire May 12, with loss of about $42,000.

The Moon Motor Car Co., St. Louis, manufacturer of automobiles, is disposing of a stock issue of $570,000, the proceeds to be used in part for extensions, operations, etc.

The Common Council, Leoti, Kan., has arranged for a bond issue of $25,000 for the installation of a municipal electric power plant.

The National Coal & Industrial Association, 654 South Main Street, Somerset, Ky., recently incorporated with a capital of $100,000, has plans under way for the installation of electrical equipment, hoisting machinery and mining equipment at coal properties at Wiborg, Ky. William H. Taylor is president and general manager.

The Henderson Produce Co., Laclede, Mo., is planning for the installation of a cold storage and refrigerating plant at its warehouse.

The Southern Engine & Boiler Works, Memphis, Tenn., has been organized to take over and operate the plant of the Harvey Steel Products Corporation, Jackson, Tenn., recently acquired under bankruptcy proceedings by Fletcher Goodwill, president National Chatauqua County Bank, Jamestown, N. Y., and associates. Possession will be taken at an early date and improvements made to accommodate the new line of production.

The Golf Shaft & Block Co., North Memphis, Tenn., recently organized with a capital of $250,000, to manufacture shuttle blocks and kindred equipment, has acquired a local plant and will commence operations at an early date. R. E. Dickinson is president.

The Pacific Petroleum Co., Tulsa, Okla., has leased the Crystal White oil refinery at Allen, Okla., for the establishment of a new plant. Improvements will be made and a capacity of about 1000 bbl. of crude oil per day developed. R. A. Irwin is manager.

The Economy Tire Sales Co., Texarkana, Ark., recently organized, is planning to establish a factory to manufacture caterpillar chain protectors for automobile tires. T. K. Falconer, Little Rock, Ark., heads the company.

The Common Council, Burbank, Okla., has arranged for a bond issue of $27,000 for the installation of a municipal electric power plant. J. M. Buckley is engineer.

Bonds for $199,000 have been voted for a new high school at Marshall, Mo., to include a vocational department.

J. M. Thompson, city clerk, Germantown, Tenn., is making inquiries for a generator, exciter, switchboard and other electrical equipment for the new municipal power plant.

The Common Council, Lepanto, Ark., has plans in progress for a municipal electric light and power plant to cost about $35,000. F. M. White, mayor, is in charge.

Buffalo

BUFFALO, May 29.

J. Emig & Son, 44 Henry Street, Buffalo, general machinists, have awarded a contract to the Peckham Construction Co., Niagara Life Building, for a new one-story machine shop at 871-75 East Ferry Street. Edward R. Emig is head.

Harry N. Kraft, 26 Summit Avenue, Buffalo, and associates, have acquired the Moffat brewery property, South Elmwood Avenue and Mohawk Street, 165 x 235 ft., and are organizing a company to build an eight-story automobile service building and repair plant with capacity for about 1200 cars.

The Tichener Iron Works, 6-20 Spring Forest Avenue, Binghamton, N. Y., manufacturer of architectural and ornamental iron products, is planning for the erection of an addition to cost about $40,000. L. E. Barnes is secretary.

The Third & Lafayette Street Garage, Jamestown, N. Y., is planning for the installation of machine shop equipment. S. G. Robbins is head.

John H. Meahl, Commissioner of Parks and Public Buildings, Municipal Building, Buffalo, will receive bids until June 12 for the erection of a power plant and equipment, electrical apparatus and refrigerating machinery, etc., at the J. N. Adam Memorial Hospital, Perrysburg, N. Y.

Boland & Bartlett, 131 Hawley Street, Binghamton, N. Y., are arranging a list of equipment to be installed in the machine shop of a new automobile service building at Westover.

The International Burr Corporation, 500 Newell Street, Watertown, N. Y., is planning for the installation of a quantity of machinery at its plant for the production of grinding burrs, including special equipment. F. W. Aiken is in charge.

The Common Council, Hamburg, N. Y., has plans under way for a new electrically-operated pumping plant, to cost about $75,000.

The Progressive Machine Co., Falconer, N. Y., is arranging a list of equipment for installation in a machine shop on West Main Street.

A power house will be installed in the new building to be erected by the Buffalo Athletic Club, on Niagara Square, to be twelve stories, 116 x 253 ft., estimated to cost about $2,000,000. Edward B. Green & Son, Buffalo, are architects.

The Love & Love Co., Barnes Street, Gouverneur, N. Y., manufacturer of automobile truck bodies, is planning for the installation of new equipment.

H. C. Garrett & Co., Charlotte, Rochester, N. Y., are planning for the installation of machine tools and other equipment for a shop on Stutson Street.

Detroit

DETROIT, May 29.

The Valley City Motor Car Co., Grand Rapids, Mich., is planning the erection of a one-story service and repair building, 115 x 180 ft. with machine shop.

The Aero Cushion Inner Tire & Rubber Co., 907 Ford Building, Saginaw, Mich., has completed plans for a new one-story factory, 80 x 200 ft., estimated to cost about $75,000. J. J. O'Shaughnessy is manager.

The Kalamazoo Vegetable Parchment Co., River Road, Kalamazoo, Mich., will soon call for bids for a four-story paper mill addition, estimated to cost about $500,000, including machinery. Billingham & Cobb, Press Building, are architects.

The Doble-Detroit Steam Motors Co., 408 McKerchey Building, Detroit, is planning the establishment of new works at Los Angeles, Cal., for the manufacture of steam-driven automobiles. It is expected to begin operations in August.

The Fisher Body Corporation, General Motors Building, Detroit, is said to be planning the erection of new six-story works, 102 x 975 ft., on Fort Street, to manufacture automobile bodies, estimated to cost in excess of $500,000. Albert Kahn, 1000 Marquette Building, is architect.

The C. G. Spring Co., Kalamazoo, Mich., manufacturer of automobile springs, etc., has acquired the works of the Lewis Spring & Axle Co., Coloma, Mich., for a branch plant.

The Detroit Edison Co., 2000 Second Avenue, Detroit, has plans nearing completion for a one-story addition to its service building at Second and Elizabeth avenues. It will also make extensions and improvements in its power plant on the Huron River, near Ypsilanti, Mich., to cost close to $30,000. Alexander Dow is president.

A vocational department will be installed in the new high school to be erected at Lapeer, Mich., to cost about $200,000, for which bonds have been voted.

The Gulf States

BIRMINGHAM, May 29.

The Great Texas Oil & Refining Co., Fort Worth, Tex., operating refineries at Breckenridge and De Leon, Tex., has plans under way for a new refinery at Mineral Wells, Tex., with initial capacity of about 1000 bbl. per day. F. O. Stevenson is engineer.

The Claussen Lock & Safe Co., 616 Market Street, San Antonio, Tex., recently organized, is planning for the installation of equipment, including drill press, electric grinder and other machinery. H. H. Claussen is vice-president and general manager.

The Dallas Power & Light Co., Dallas, Tex., has plans under way for a new electric generating plant, 112 x 156 ft., with initial capaacity of 15,000 kw., steam-operated, estimated to cost in excess of $1,500,000, including turbo-generator, boilers, stokers, conveying machinery, etc. C. E. Calder is president.

The Dallas Battery Box Co., Dallas, Tex., has leased a building and plans for the immediate installation of machinery to manufacture electric battery boxes and kindred equipment.

The West Lumber Co., Connell, Tex., has tentative plans for rebuilding the portion of its lumber plant, destroyed by fire May 23, with loss estimated at $200,000, including machinery and power equipment.

The Service Foundry Co., Beaumont, Tex., has acquired a local site and plans the construction of a new foundry and pattern shop for the production of iron and other metal castings.

The Boren-Stewart Grocery Co., Dallas, Tex., will install a cold storage and refrigerating plant in its new two-story warehouse, 100 x 150 ft., estimated to cost about $125,000. Hyman Pearlstone is vice-president.

The Charles T. Lehman Machinery Co., 2300 Avenue A, Birmingham, is making inquiries for wood-working machinery, including automatic gang saw and rip raw sharpeners, gang saw filing clamps, etc.

The Merchants' Produce Co., Amarillo, Tex., has had plans prepared for a new ice-manufacturing and cold storage plant, with initial capacity of about 30 tons a day.

The Texas-Mexican Oil & Refining Co., Milno Bank Building, Laredo, Tex., recently organized, has completed plans for a new refinery to cost about $85,000. J. N. Galbraith is president.

The Common Council, Homestead, Fla., is completing plans for a new municipal electric power plant to cost about $50,000.

The Atlas Oil Co., Monroe, La., has plans under way for a new carbon plant, estimated to cost in excess of $200,000, including machinery. A gasoline extraction works will also be built.

The Huff Mfg. Co., Miami, Fla., recently organized, will soon commence the erection of a plant, 35 x 125 ft., to manufacture blow torches, etc. Hugo C. Eastman is secretary.

A vocational department will be installed in the new high school to be constructed at Burkburnett, Tex., estimated to cost about $150,000. C. H. Page & Brother, Austin, Tex., are architects.

A power plant will be constructed by the Non-Acid Fertilizer & Chemical Co., Lakeland, Fla., in connection with its new works. C. H. Deen is president, and H. E. Memminger, engineer and manager.

The Sewerage and Water Board, room 303, 526 Carondelet Street, New Orleans, will take bids until July 19 for a 6000 kw. turbo-generator and auxiliary power equipment. A. G. Moffat is secretary.

The Municipal Ice Department, Leesburg, Fla., has preliminary plans under way for extensions and improvements in its ice-manufacturing plant to cost about $50,000. W. E. Rogers is manager.

A vocational department will be installed in the new high school to be erected at Kaufman, Tex., estimated to cost about $100,000. O. P. Norman is superintendent.

Indiana

INDIANAPOLIS, May 29.

The Sullivan Machinery Co., 122 South Michigan Avenue, Chicago, manufacturer of mining machinery, air compressors, etc., has preliminary plans under way for the erection of a new one and two-story factory at Michigan City, Ind. A. S. Colin, 39 West Adams Street, Chicago, is architect.

The Duesenberg Auto & Motor Co., West Washington and Harding streets, Indianapolis, will build a one-story power house.

The Calumet Tank & Mfg. Co., Hammond, Ind., will soon commence the erection of a new one-story factory, 60 x 140 ft., on Industrial Road, estimated to cost $70,000, including equipment. E. R. Kyler is president and treasurer.

Fire, May 22, destroyed a portion of the plant of the Indiana Refrigerating Co., 232 South Pennsylvania Street, Indianapolis, with loss estimated in excess of $60,000, including equipment. B. E. Metcalf is secretary.

A vocational department will be installed in the two-story and basement high school to be erected at Mitchell, Ind., estimated to cost about $100,000. Clifford Shopbell & Co., 700 Furniture Building, Evansville, Ind., are architects.

An ice manufacturing plant will be installed in the new one-story and basement factory, 90 x 140 ft., to be erected at Calumet Boulevard and 150th Street, Hammond, Ind., by the Consumers' Ice Cream Co., Hammond, estimated to cost about $60,000. M. B. Carpenter, 105 North Clark Street, Chicago, is architect and engineer. James Dixson is general manager.

A vocational department will be installed in the new two-story and basement high school to be erected at Tell City, Ind. Clifford Shopbell & Co., 700 Furniture Building, Evansville, Ind., are architects.

Canada

TORONTO, May 29.

The machine tool market continues fairly active and demand is slowly but steadily assuming larger proportions. Prospective business, however, appears to be the chief feature. Neither railroads nor car shops are showing much interest and buying from these sources is at a minimum. The automotive industries are principal sources of demand for machine tools and supplies. A number of electrical and waterworks plants are proposed and it is expected that the call for equipment on this account will show more activity in the near future. Construction on new industrial plants is going ahead and a large part of the requirements for these is still to be let. The Toronto City Council has recently entered the market for equipment for the Island waterworks plant and in addition is now asking for a gap lathe, for which bids will be received by C. Alfred Maguire up to June 6. The demand for small tools is active with users continually entering the market for supplies for both spot and future delivery.

The Campbell Iron & Steel Works, Carling Avenue, Ottawa, will build a service station.

Field & Patterson, Sawridge, Alta., will build a sawmill to cost $30,000 and are interested in prices of equipment.

The Breen Motor Co., Broadway and Sherbrooke streets, Winnipeg, Man., will erect a garage at a cost of $100,000.

The general contract for a factory to cost $180,000 for the Western Clock Co., Peterboro, Ont., has been let to Sullivan & Fried, 81 Victoria Street, Toronto.

The McMurray Asphaltum & Oil, Ltd., Petrolia, Ont., contemplate oil production at Fort McMurray, Alta. Piping, tanks, refining equipment, etc., will cost $250,000.

The shingle mill owned by Joseph Hadley, Lindsay, Ont., was destroyed by fire with loss to building and equipment estimated at $65,000.

The Thomas D. Watson Co., Kingston, Ont., has started work on two buildings of the proposed plant to be erected there. The building now under construction are the foundry and machine shops and a 12-ton cupola will form part of the foundry equipment. The foundry, will be 70 x 110 ft. and the machine shop, 70 x 110 ft., both of reinforced concrete and steel construction. The other buildings will be started as soon as possible.

According to Mr. Moore, manager of the International Nickel Co., Port Colborne, Ont., another furnace has been put in operation to meet improved conditions in the demand for nickel, etc.

The City Council, Owen Sound, Ont., has authorized the issuing of debentures up to $200,000 for the work necessary in building a new technical school, 48 x 375 ft., to include wood-working and machine shops, forge shops, etc.

The Dominion Bridge Co., Montreal, has the contract for installing on 80 ft. traveling crane in the plant of the Lackawana Tube Co., Welland, Ont. This plant is now being equipped to produce boiler tubing, etc., and it is reported that the first year's output has already been sold. Billets for the mill will be made in a rolling mill which is now preparing to locate in Welland.

The Page-Hersey Tubes, Ltd., Church Street, Toronto, is in the market for one high pressure pump, 250 Imperial gals. per min., at 35 r.p.m., 700 lb. pressure; also one 150 hp., 500 r.p.m., 220 or 2200 volt, three phase, 25 cycle, squirrel cage induction motor for direct connection.

The Buffalo Foundry & Machine Co., Buffalo, has recently acquired the coppersmithing business formerly conducted by W. A. Case & Son Mfg. Co., Buffalo, including the copper shop equipment used by them in this work, which will add to its regular line of vacuum dryers, evaporators and chemical apparatus all kinds of copper work, including copper distilling apparatus, copper evaporators, copper kettles, copper vacuum pans, copper coils, etc., and do a general coppersmithing business either in new work or repairs.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipments in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

	Per Lb.
Bars:	
Refined irons bars, base price	2.48c.
Swedish bars, base price	7.00c.
Soft steel bars, base price	2.48c.
Hoops, base price	3.38c.
Bands, base price	2.98c.
Beams and channels, angles and tees 3 in. x ¼ in. and larger, base	2.58c.
Channels, angles and tees under 3 in. x ¼ in., base	2.48c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger	2.60c.
(Smooth finish, 1 to 2½ x ¼ in. and larger)	2.80c.
Toe-calk, ½ x ⅜ in. and larger	3.30c.
Cold-rolled strip, soft and quarter hard	6.25c. to 7.25c.
Open-hearth spring steel	3.50c. to 6c.
Shafting and Screw Stock:	
Rounds	3.35c.
Squares, flats and hex	3.85c.
Standard cast steel, base price	12.00c.
Extra cast steel	17.00c.
Special cast steel	22.00c.

Tank Plates—Steel

¼ in. and heavier	2.58c.

Sheets

Blue Annealed

	Per Lb.
No. 10	3.43c. to 3.53c.
No. 12	3.48c. to 3.58c.
No. 14	3.53c. to 3.63c.
No. 16	3.58c. to 3.73c.

Box Annealed—Black

	Soft Steel C. R., One Pass, Per Lb.	Blued Stove Pipe Sheet, Per Lb.
Nos. 18 to 20	4.00c. to 4.15c.	.....
Nos. 22 and 24	4.05c. to 4.20c.	3.35c.
No. 26	4.10c. to 4.25c.	4.40c.
No. 28	4.20c. to 4.35c.	4.50c.
No. 30	4.45c. to 4.60c.	.....

No. 28 and lighter, 36 in. wide, 10c. higher.

Galvanized

	Per Lb.
No. 14	4.30c. to 4.45c.
No. 16	4.45c. to 4.60c
Nos 18 and 20	4.60c. to 4.75c.
Nos. 22 and 24	4.75c. to 4.90c.
No. 26	4.90c. to 5.05c.
No. 27	5.05c. to 5.20c.
No. 28	5.20c. to 5.35c.
No. 30	5.70c. to 5.85c.

No. 28 and lighter, 36 in. wide, 20c. higher.

Welded Pipe

Standard Steel	Black	Galv.	*Wrought Iron*	Black	Galv.
½ in. Butt	—56	—40	¾ in. Butt	—30	—13
¾ in. Butt	—61	—47	1½ in. Butt	—32	—15
1-3 in. Butt	—63	—49	2 in. Lap	—27	—10
3½-6 in. Lap	—60	—46	2½-6 in. Lap	—30	—15
7-8 in. Lap	—56	—34	7-12 in. Lap	—23	— 7
9-12 in. Lap	—55	—33			

Steel Wire

BASE PRICE* ON NO. 9 GAGE AND COARSER	Per Lb.
Bright basic	3.50c. to 3.75c.
Annealed soft	3.50c. to 3.75c.
Galvanized annealed	4.25c. to 4.50c.
Coppered basic	4.00c. to 4.25c.
Tinned soft Bessemer	5.50c. to 5.75c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	16¾c. to 17¼c.
High brass wire	17 c. to 17¾c.
Brass rod	14½c. to 15 c.
Brass tube, brazed	23¼c. to 23¾c.
Brass tube, seamless	18¾c. to 19¾c.
Copper tube, seamless	21¾c. to 22¼c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 20¼c. to 21¼c. per lb. base.

Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.

Tin Plates

Bright Tin		Coke—14-20		
	Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20		Primes	Wasters
			80 lb.	$6.05	$5.80
			90 lb.	6.15	5.90
			100 lb.	6.25	6.00
IC	$10.00	$8.50	IC	6.40	6.15
IX	11.50	10.00	IX	7.40	7.15
IXX	13.00	11.25	IXX	8.40	8.15
IXXX	14.25	12.50	IXXX	9.40	9.15
IXXXX	16.00	14.00	IXXXX	10.40	10.15

Terne Plates

8-lb. coating, 14 x 20

100 lb.	$7.00
IC	7.25
IX	7.50
Fire door stock	9.00

Tin

Straits, pig	33½c.
Bar	40c. to 44c.

Copper

Lake ingot	15¼c.
Electrolytic	15 c.
Casting	14¾c.

Spelter and Sheet Zinc

Western spelter	6½c. to 7c.
Sheet zinc, No. 9 base, casks	8½c. open 9c.

Lead and Solder*

American pig lead	6½c. to 6¾c.
Bar lead	7 c. to 7½c.
Solder, ½ and ½ guaranteed	23c.
No. 1 solder	21½c.
Refined solder	18c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	75c.
Commercial grade, per lb.	35c
Grade D, per lb.	25c.

Antimony

Asiatic	6½c. to 7c.

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	25c. to 27c.

Old Metals

Business is active and values are firm. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy crucible	11.50
Copper, heavy wire	11.00
Copper, light and bottoms	8.75
Brass, heavy	5.75
Brass, light	4.75
Heavy machine composition	8.50
No. 1 yellow brass turnings	5.75
No. 1 red brass or composition turnings	7.50
Lead, heavy	4.25
Lead, tea	3.00
Zinc	2.50